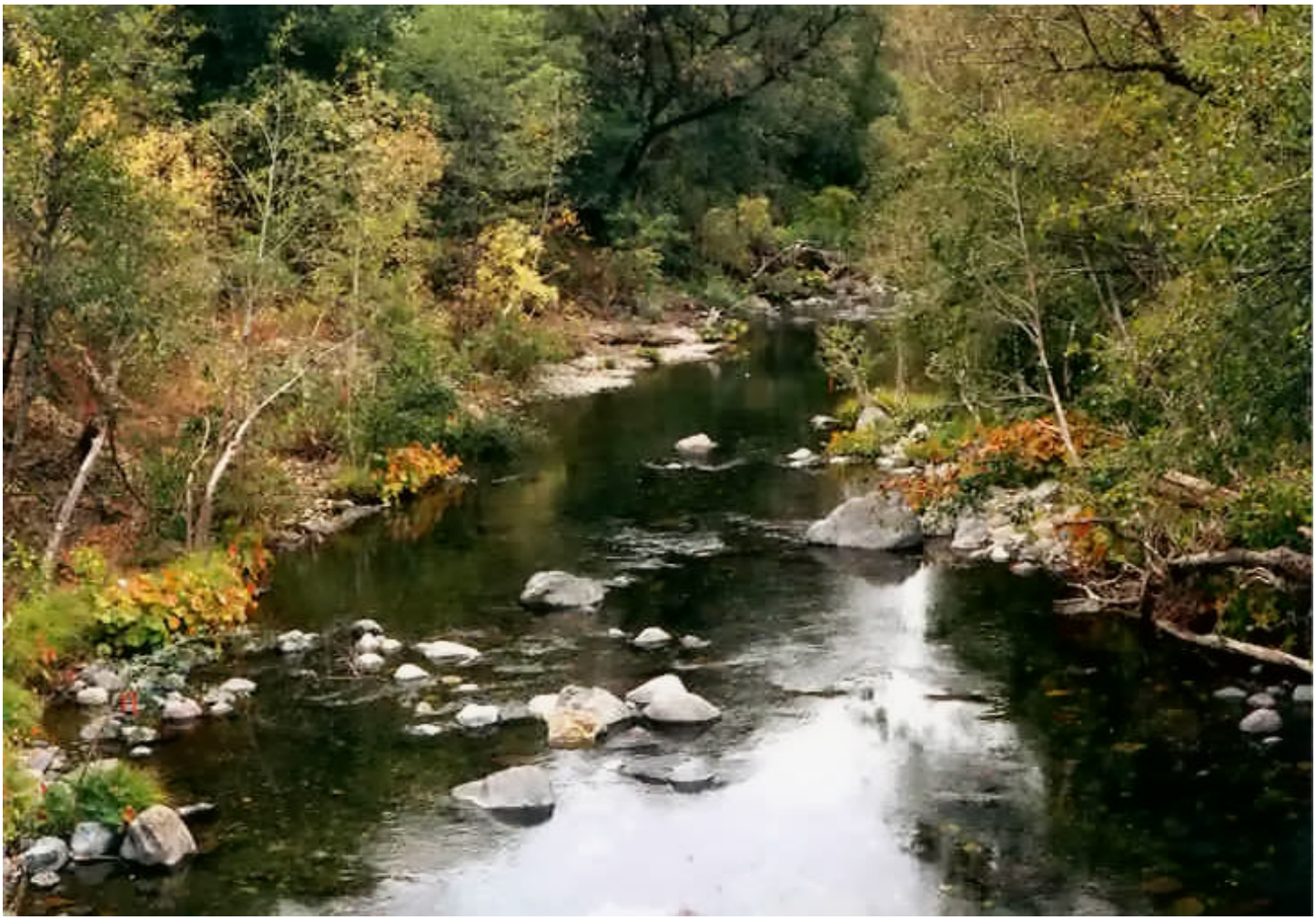
Effluent Dominated Water Bodies

Draft Report



September 2000

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

REGIONAL WATER QUALITY CONTROL BOARD

CENTRAL VALLEY REGION

Effluent Dominated Water Bodies

DRAFT REPORT

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State of California

California Environmental Protection Agency

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PREFACE TO SEPTEMBER DRAFT

This draft report examines the issues surrounding Effluent Dominated and Effluent Dependent Water Bodies (EDWs) in the Central Valley Region. It is meant to serve as a guide for the Central Valley Regional Water Quality Control Board (Regional Board), Board staff, affected stakeholders and interested parties. This report examines state and federal regulations, discusses some of the elements of beneficial use protection and the major discharger concerns, summarizes current and past efforts, and outlines several options and recommendations that Board staff has identified to address this issue. In preparing this report Board staff worked with state and federal agencies (California Department of Fish and Game, Department of Health Services, National Marine Fisheries Service, the U.S. Fish and Wildlife Service, and the U.S. Environmental Protection Agency), dischargers (the Central Valley Water Managers Association and the El Dorado Irrigation District) and environmental groups (DeltaKeeper and the Nature Conservancy).

On August 4, 2000, an informational presentation on EDWs was presented to the Regional Board. This staff report supports and expands on the information from that presentation. This is a draft report which will be finalized in October of 2000, after a 30 day public comment period.

DRAFT EXECUTIVE SUMMARY

Introduction

Since 1975, the Regional Board has adopted approximately 50 permits for discharges of treated municipal wastewater into ephemeral water bodies or water bodies with limited dilution capacity. Discharge into these streams have created Effluent Dominated Water Bodies (EDWs) and altered their beneficial uses. Because there is limited dilution capacity, permit limits are usually set equivalent to receiving water limits which are the water quality objectives adopted in the Basin Plan. Some of these limits have proven difficult to meet by the dischargers. Many of these streams are unnamed in the Basin Plan and have had their beneficial uses, and associated water quality objectives, defined indirectly by use of the tributary rule. The tributary rule, simply stated, assigns the beneficial uses of the major rivers to their tributaries. The 1998 Triennial Review of the Basin Plan identified EDW as a major issue and the Board asked staff to report back on possible ways to address the issue. Unfortunately, given the limited resources available in the current and foreseeable budgets, only the legally mandated Basin Planning tasks are being performed, and these do not include addressing the issues associated with EDWs.

Problem Statement

There are several issues associated with EDWs. The planning staff has identified beneficial use protection – including endangered species preservation, discharger concerns and permitting issues as interrelated areas which will need to be addressed. Historically, permits for discharge into streams with a low assimilative capacity assumed that by requiring dischargers to provide a high quality effluent, as measured by traditional chemical parameters, there would be minimal impact on the environment. Recently, it has been recognized that there are consequences of increasing flows into streams that go beyond the traditional chemical concerns. A more in depth discussion of these issues is presented in the attached staff report.

- **Applicable Laws and Water Quality Regulations.**

  There are several federal and state laws and regulations that contain provisions that must be addressed when dealing with EDWs. These include the Clean Water Act, the Endangered Species Acts -both federal and state (ESAs), California Porter-Cologne Water Quality Control Act, and The California Environmental Quality Act.

- **Beneficial Use Protection.**

  Beneficial use considerations include the ability of small streams to support both a WARM and COLD fishery, other chemical changes and the effects of the discharge on the stream channel morphology, including erosion and changes to the 100 year floodplain. Additionally, the presence of continuous water flow may have created beneficial uses that should be protected. Some of these uses include establishing a warm water fishery and recreational opportunities.

An increasingly important consideration in developing a policy for EDWs is ESAs . When listed species are present any change to the habitat must address the "take" of the species. Both allowing a new or increased discharge or the removal of a discharge could affect the ability of a listed species to survive or recover. Currently there are a number of listed species for which stream habitats must be managed. The most widely known of these being central valley steelhead and certain salmon runs. National Marine Fisheries Service staff has indicated that they will require protection of salmonid habitat even if that habitat is marginal, and would only be used opportunistically by the listed species. Some of the streams, depending on elevation, may have listed amphibians and plants. Managing the habitat for multiple species is a challenge. The change of a stream from an ephemeral to perennial flow, with the addition of treated wastewater, may create an opportunistic habitat for listed fish species, while at the same time create detrimental habitat for listed amphibians. For example, changing the flow from ephemeral to perennial may attract populations of bullfrogs which are major predators of the federally-listed red-legged frog. The red legged frog has adapted its life cycle to take advantage of a seasonal or ephemeral flow regime.

The major issues in developing a policy to address beneficial use protection will be different for existing discharges versus allowing new discharges. A policy addressing existing discharges will have to consider the beneficial uses induced by the continuous flow including what objectives should apply to the streams and when it might be desirable and possible to restore the habitat to its pre-discharge condition. A policy addressing new discharges will have to address under what conditions it would be appropriate to allow the creation of new EDWs. The availability of highly treated wastewater in a watershed may present opportunities to use the water to the benefit of the ecosystem. A policy to address new discharges, or increased discharges, will have to consider ways to use the water to provide a net environmental benefit. For example, increased flow into an existing EDW, in conjunction with habitat restoration, could provide an enhanced habitat for listed fish species.

- **Discharger Concerns.**
  Dishargers have questioned the appropriateness of beneficial use determinations included in permits and water quality objectives for the ephemeral and low flow tributaries. The ability to meet the objectives may be prohibitively expensive, or may not be technically feasible. Some of the parameters of concern for the dischargers include copper, zinc, arsenic, pesticides, chronic toxicity, bacteria, disinfection by-products, pH, temperature, turbidity, and dissolved oxygen. These constituents are discussed in detail in the attached issue paper.

- **Permitting Issues**

  Recent legislation (SB 709 – Migden) has greatly increased the liability for dischargers that are out of compliance with permit limits. Consequently, development and adoption of permits has become very time consuming and contentious. As permitees are considered for renewal, numerous dischargers have questioned the need for stringent effluent

limits in these water bodies and requested that the Regional Board consider amending the Basin Plan to address their concerns. Currently, eleven discharges have asked the Regional Board to consider amending the Basin Plan to address their individual concerns.

- **Basin Planning and Resource Issues**
  Even if the dischargers collect all the information and do all the research to support their proposed Basin Plan amendment it still takes a significant amount of staff time to evaluate the dischargers' reports, coordinate with other resource agencies, and the public, and process the amendment (i.e., prepare staff reports and agenda items, complete FED and economic analysis, respond to comments, prepare official record, and obtain State Board, OAL and U.S.EPA approval). Given the large number of potential players it will take an unacceptable amount of time to process requests on a permit by permit basis. Also, focusing on a discharger specific area will, by its nature, not allow the Board to consider the watersheds as a whole. With the current planning budget (0.6 person years for the entire Region) devoted to legally mandated reviews we will be unable to process discharger requests in a timely manner. If planning staff are diverted to working on discharger specific amendments we will jeopardize programmatic commitments mandated by legislative authorizations and requirements, federal grant contracts and other funding constraints. Even if additional external funding is provided it is unlikely, given personnel constraints, that more that one or two additional staff would be approved to address EDWs. Additionally, staff may not be able to change the basin plan to completely alleviate the discharger concerns. Existing uses of the water may preclude either the adoption of revised beneficial uses or site specific objectives.

  The planning staff is also concerned with the way highly treated municipal waste water is being used. With the increase in population, and subsequent increase in discharge volumes are we using the water for the best purposes? Current reclamation projects have focused on using the water primarily for irrigation. Proposed projects to reclaim the water for drinking water replenishment have met with public opposition. There is the potential to develop a policy for water reuse that would have a net environmental gain. Examples include riparian restorations in areas where diversions have compromised the beneficial uses of the waters or degraded the habitat.

Absent a policy for dealing with the disposal of highly treated waste water, whether into streams or for environmental restorations, the regulatory staff and the Board are required to spend more and more time on each permit as the discharges are not willing to agree to permit limits that leave them open to mandatory fines.

Options

1. **Participate in Statewide Efforts to Develop Policies and Use These to Guide Permit Development.**
   This is the "status quo" option. Existing Regional Board staff resources would be used to participate in efforts to develop a statewide policy on effluent dominated water bodies through statewide effort to develop a policy for EDWs. The State Board Freshwater Standards Unit has identified development of a statewide policy on EDWs as its top priority. Even if one of the other options are selected this option will also be pursued. In

ority. Even if one of the other options are selected this option will also be pursued. In addition to working with State Board to develop a statewide policy, Regional Board staff is committed to working with El Dorado Irrigation District (EID) on a proposed BPA for turbidity, pH, and temperature for Deer Creek. EID has agreed to reimburse staff time to support this effort, which is projected to be completed in November 2001

Pros:

- Would provide consistent statewide approach in addressing EDWs.
- Could be performed using existing staff resources.

Cons:

- Dischargers' concerns would not be met for a considerable time.
- Dischargers would face stiff, non-discretionary, fines for failing to meet water quality objectives.
- Regulatory staff would have to come up with permit specific ways to deal with the requirements.
- The potential for using the water for a net environmental gain would be lost in the near term and may not be addressed in a final statewide policy.

2. **Design Site Specific Objectives and/or Beneficial Use Designations on a Permit by Permit Basis.**
Under this option staff would evaluate information and recommendations submitted by dischargers and amend the basin plan as appropriate. During this process staff would evaluate the information submitted for applicability beyond the specific site(s) being studied and would propose a general basin plan amendment to reflect such analysis as warranted.

The Regional Board has already committed to this option with El Dorado Irrigation District (EID) on the condition that funding be provided for staff work. Presumably this same condition would apply to any other dischargers proposing Basin Plan amendments, although the Regional Boards typically have hiring restrictions that limit the number of new staff that can be hired.

Pros:

- May provide a means to address individual discharger concerns.
- If basin wide amendments are identified and are successfully adopted during site specific reviews, the permit process could be streamlined for those objectives.

Cons:

- Site specific evaluations may not provide consistent objectives that address the health of the watershed.
- Would require additional funding for staff review of discharger submitted proposals. Funding could come from a cost reimbursement program or from requesting budgetary augmentations.

- Due to hiring restrictions, even with resource augmentations, it would take many years to address all of the permitees who currently discharge into low flow or ephemeral water bodies thus creating an unacceptable burden on both the regulatory staff and the dischargers.
- The potential for using the water for a net environmental gain would not be addressed in the development of site specific objectives or stream specific beneficial use designations.

3. **Work Proactively with Groups of Dischargers within Watersheds to Develop Basin Plan Amendments and Address Discharger and Regional Board Concerns.**
Under this option staff would focus on working with dischargers within a single watershed or group of related watersheds to collect the data necessary to develop appropriate basin plan amendments for the watershed(s). As with Option 2 above, staff would evaluate the information submitted for applicability beyond the specific site(s) being studied and would propose a general basin plan amendment to reflect such analysis as warranted. This would include identifying dischargers who are not currently up for permit renewal but would be willing to participate in data gathering and in the process of developing a Basin Plan amendments and potentially provide resources for Regional Board staff review.

Pros:
- Will provide a means to address discharger concerns on a watershed basis.
- If basin wide amendments are identified and are successfully adopted the permit process could be streamlined for all dischargers with similar issues.
- The potential to address the reuse of the treated wastewater for riparian restorations and reuse within the watershed could be addressed.
- Would identify watershed level parameters of concern and address these in an efficient manner.
- Would allow staff to compile data on the watershed that could eventually be used to support a Regional Board or statewide policy on discharges to ephemeral or low flow streams.
- Could be cost effective for dischargers within the selected watersheds as a result of sharing common areas of study.
- Would streamline the permit writing for dischargers within the selected watershed(s).

Cons:
- Even on a watershed basis it may take years to address all of the areas of concern for all of the dischargers.
- Would require additional funding for staff review of discharger submitted proposals. Funding could come from a cost reimbursement program or from requesting budgetary augmentations.
- Without additional funding, beyond that required for the individual watershed reviews, staff may not be able to develop a policy that would address all of the concerns

associated with existing or future discharges into streams with limited dilution capacity.

Recommendation and Discussion

Staff recommends Option 3. This option would have the highest potential for protecting beneficial uses, addressing discharger concerns and addressing Regional Board concerns. This option would allow staff to address short term discharger concerns while concurrently developing a watershed specific, and with an incremental increase in funding, a Region wide policy. Staff proposes to work with stakeholders in the Placer County area. Discussions with dischargers have indicated that they would be willing to follow the example of EID and pay for Regional Board staff time to review information gathered and proceed with appropriate basin plan amendments. Staff estimates that an additional 15% over any discharger/watershed specific funding and additional monitoring money could provide the resources necessary to concurrently develop a Region-wide policy for dealing with highly treated municipal waste water as discussed in the attached staff report. Staff recommends that a cost reimbursement program be set up for dischargers willing to participate in a watershed, or possibly multiple watershed, approach and that additional funding for policy development be pursued either in the form of budget change proposals or through participation by the dischargers.

The most significant disadvantage to Option 3 is that, by focusing on one watershed area initially, dischargers in other areas may not have their issues addressed immediately. However, by developing a watershed approach, it is much more likely that a region-wide policy framework can be developed. The preferred option does not specifically preclude staff from working with dischargers in other areas but the reality of staff limitations makes this difficult without significant additional funding sources being identified.

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INTRODUCTION

The characteristics of many small or ephemeral surface water bodies in the Central Valley are dominated or greatly influenced by discharges of wastewater from municipal wastewater treatment facilities. The influence is most pronounced when natural flows in receiving water streams are low (compared to the volume of effluent discharged) or when natural flows fluctuate greatly with the seasons. Water bodies with flow regimes that are dominated by the presence of effluent from permitted discharges are labeled Effluent Dominated or Effluent Dependent Water bodies (EDWs).

Many of the small water bodies in the Central Valley are naturally ephemeral or experience very low flow during the dry summer. Other small tributaries are likewise ephemeral, but, excluding precipitation events, are normally dry during the winter and experience highest flows during the summer irrigation season when they are dominated by spilled irrigation supply water and agricultural drainage. When wastewaters are discharged to ephemeral streams or streams with minimal natural flow, stream characteristics can be significantly changed, for better or for worse.

Currently, there are approximately 50 municipal wastewater treatment facilities in the Central Valley Region that discharge treated wastewater to surface streams, creeks, rivers, and sloughs (see Appendix: Figure 1 and Table 1). Many of these facilities have been discharging for a number of years.

The population of the 19 counties that comprise the Central Valley[1] is projected to more than double from 6 million people today to 12.2 million people by 2040.[2] As communities expand into rural areas, more facility managers are proposing to discharge treated municipal effluent into ephemeral water bodies or streams with limited dilution capacity, and many facilities that currently discharge to ephemeral or low flow streams are planning to increase their discharge. The lack of an approach or policy on EDWs places staff in a difficult position in determining how best to protect water quality in these water bodies.

In the recent triennial review of the Central Valley Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (Basin Plan), EDWs were identified as the highest priority basin planning issue by the Regional Board, and staff was directed to prepare a paper examining this issue. Staff was also directed to discuss the resources required and available for staff to work on this issue and make a recommendation on how the Board should proceed.

Most of the controversy surrounding the EDW issue is associated with aquatic life beneficial uses and includes the following:

- How do regulatory rules apply to EDWs?
- What water quality conditions and criteria are appropriate for EDWs?

[1] Butte, Colusa, Fresno, Glenn, Kern, Kings, Madera, Merced, Placer, Sacramento, San Joaquin, Shasta, Solano, Stanislaus, Sutter, Tehama, Tulare, Yolo, Yuba

[2] The Great Valley Center (http://www.greatvalley.org/research/index.htm) and the California Department of Finance (http://www.dof.ca.gov/HTML/DEMOGRAP/Proj_age.htm)

- Under what circumstances should the existing characteristics of a natural system be allowed to be changed by either allowing or terminating effluent discharge?
- What are the costs and environmental consequences associated with establishing and maintaining, or disallowing EDWs?
- What kind of aquatic life uses need to be protected?
- How can net environmental benefit be achieved?

This report includes the following sections:

- **Applicable Water Quality Laws and Regulations:** There are several federal and state laws and regulations containing provisions applicable to EDWs, including the Clean Water Act, the Endangered Species Act, California Porter-Cologne Water Quality Control Act, the California Environmental Quality Act and the California Endangered Species Act.
- **Beneficial Use Protection:** This section explains the factors relating to beneficial use protection and outlines some of the major ecological considerations specific to EDWs. Lack of data has been identified as a problem in this area.
- **Parameters of Concern to Dischargers:** Permit requirements in EDWs can be a concern for dischargers. Some of the parameters that dischargers have trouble meeting effluent limits for are toxic chemicals, turbidity, temperature, dissolved oxygen, pH and bacteria.
- **Efforts to Address EDWs:** Current and past efforts to address EDWs at the regional, state and federal level are outlined in this section.
- **Options:** This section evaluates three options identified by Board staff to address EDWs. These options are working on a statewide level, working on a permit by permit basis, or working on a watershed level.
- **Staff Recommendations and Discussion:** Staff recommends that the option to work with EDWs on a watershed level be adopted and provides justification for the recommendation.

In preparing this report Board staff worked with state agencies (State Water Resources Control Board, California Department of Fish and Game, and the Department of Health Services), federal agencies (the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, and the U.S. Environmental Protection Agency), dischargers (the Central Valley Water Managers Association and the El Dorado Irrigation District) and environmental groups (DeltaKeeper and the Nature Conservancy). Their comments, suggestions and perspectives on this issue are included in this report.

APPLICABLE WATER QUALITY LAWS AND REGULATIONS

This section describes water quality laws and regulations that are pertinent to the EDW issue and outlines mechanisms available for modifying existing beneficial use designations and water quality criteria.

The Federal Clean Water Act and Porter-Cologne

The federal Clean Water Act (CWA) – also called the Federal Water Pollution Control Act – regulates pollution in the surface waters of the United States.[3] The Act is administered by the U.S. Environmental Protection Agency (U.S.EPA), with some of the regulatory duties delegated to the states. Under the CWA, all discharges to surface waters are illegal unless authorized by a permit. Discharge permits are granted under the Act's National Pollutant Elimination System (NPDES) program.[4] The Regional Water Quality Control Boards administers the NPDES permit program, with U.S.EPA oversight.[5]

The Porter Cologne Water Quality Control Act (Porter-Cologne) of California is part of the State Water Code and directs the State Water Resources Control Board and Regional Water Quality Control Boards to protect the quality of California's waters.[6]

Antidegradation Requirements

The federal Water Quality Standards Regulation requires that each state have an antidegradation policy and establishes a three-part test for determining when increases in pollutant loadings or other adverse changes in surface water quality may be allowed.[7] Examples of when the federal antidegradation policy would be triggered include: new discharges, an expansion of existing facilities, or a reduction in the level of treatment of an existing discharge. Application of the federal antidegradation policy often hinges on the specific facts of the case. It is therefore not possible to provide a definitive exposition as to how the policy should be applied.

The federal antidegradation policy serves as an overarching water quality standard to be applied where other water quality standards are not sufficiently specific to protect beneficial uses of a particular water body or portion of the water body, or where other water quality standards do not address a particular pollutant. The antidegradation test also serves to provide guidance for standard setting and for other regulatory decisions to determine when additional control measures should be required to maintain instream beneficial uses or to maintain high quality waters. The federal antidegradation policy emphasizes protection of instream beneficial uses, especially protection of aquatic organisms.[8]

In most cases where instream beneficial uses will not be impaired and no outstanding national resource waters will be affected, the federal antidegradation policy is not an absolute bar to reductions in water quality. Rather, the policy requires that reductions in water quality be justified as necessary to accommodate important social and economic development. The outcome of the antidegradation analysis will often depend upon a balancing of competing interests with the final decision resting in the judgment of the State and Regional Boards.

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[3] 33 U.S.C. §1251-1387 Available online at: http://www4.law.cornell.edu/uscode/unframed/33/ch26.html
[4] For more information about the CWA see: http://www.cnie.org/nle/h2o-32.html
[5] For more information about Porter-Cologne see: http://ceres.ca.gov/wetlands/permitting/porter.html
[6] The State Water Code and Porter-Cologne are available online at: http://www.swrcb.ca.gov/water_laws/index.html
[7] 40 CFR 131.12 "Antidegradation Policy"
[8] More information about Antidegradation can be found in Chapter 4 of the "USEPA Water Quality Standards Handbook, Second Ed.", 1994; Located online at: http://www.epa.gov/ost/library/wqstandards/

State Water Board Resolution No. 68-16, the Statement of Policy with Respect to Maintaining High Quality of Waters in California, satisfies the federal antidegradation requirement and has been interpreted to incorporate the federal antidegradation policy in order to ensure consistency with federal Clean Water Act requirements. As with the federal policy, application of Resolution No. 68-16 is triggered by changes in water quality; however, the State Water Board resolution has broader applicability in that it addresses all waters of the State, both surface and ground. In addition, Resolution No. 68-16 considers impacts to potential uses in addition to existing uses. Finally, while the federal policy focuses on instream uses (the so-called fishable/swimmable uses (e.g., WARM, COLD, REC-1)), Resolution No. 68-16 addresses all beneficial uses of the waters of the state including such non-instream uses as municipal and domestic supply, groundwater recharge, etc.

Beneficial Uses and Water Quality Objectives

Both the CWA and Porter-Cologne require the designation of beneficial uses for water bodies and the adoption of water quality objectives (WQOs) to protect beneficial uses. State law defines beneficial uses of California's waters that may be protected against water quality degradation to include (and not be limited to) "…domestic; municipal; agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves"[9].

Water quality objectives may be numerical or narrative. For example, in the Sacramento and San Joaquin Watersheds, water bodies with the designated beneficial use of "Warm Freshwater Habitat" (WARM) must meet a WQO of no less than 5 mg/l dissolved oxygen. The WQO for sediment states that sediment load *"… shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses*"[10].

To date, neither the federal nor state water quality programs have developed a designated use for "effluent dominated water body". One of the key issues in developing criteria for EDW is determining and maintaining the beneficial use(s) of the affected water body.

Use Attainability Analysis

To remove a designated beneficial use, a Use Attainability Analysis (UAA) must be performed. States may conduct generic use attainability analyses for groups of water body segments provided that the circumstances relating to the segments in question are sufficiently similar to make the results of the generic analyses reasonably applicable to each segment. As defined in the Water Quality Standards Regulation[11], a UAA *is "…a structured scientific assessment of the factors affecting the attainment of a use which may include physical, chemical, biological, and economic factors…"*. It includes a water body survey and assessment and an economic analysis. Components of the water body survey and assessment include:

[9] Porter-Cologne Section 13050(f)

[10] *The Water Quality Control Plan (Basin Plan) for the California Regional Water Quality Control Board Central Valley Region*, Fourth Edition 1998. The full text of the Basin Plan can be found at: http://www.swrcb.ca.gov/rwqcb5/files.html

[11] 40 CFR 131.3

(1) Identify and define the existing uses.
(2) Determine if the stated uses are appropriate.
(3) Project potential uses by examining the physical, chemical, and biological characteristics of the water body.

During this process, it would be important to demonstrate the assimilative capacity of the water body and that the downstream uses of the water body will be protected.

Current designated beneficial uses are based on existing uses. According to the federal Water Quality Standards Regulations "*Existing uses are those uses actually attained in the water body on or after November 28, 1975…*".[12] An existing use cannot be removed. A designated beneficial use that has not existed in a water body since 1975 is termed a potential use. Potential uses can be removed or modified through a Use Attainability Analysis (UAA). In this situation, a UAA can only be considered if existing uses are to be protected and best management practices for nonpoint source control have been implemented.[13] As stated in the Federal Water Quality Standards Regulations:

"States may remove a designated use which is not an existing use, as defined in 131.3, or establish sub-categories of a use if the State can demonstrate that attaining the designated use is not feasible because:

(1) Naturally occurring pollutant concentrations prevent the attainment of the use.
(2) Natural, ephemeral, intermittent, or low-flow conditions or water levels prevent the attainment of the use.
(3) Human-caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place
(4) Dams, diversions, or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use.
(5) Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow depth… unrelated to water quality preclude attainment of aquatic life protection uses.
(6) Controls more stringent than those required by Sections 301(b)(1)(A) and (B) and 306 of the Clean Water Act would result in substantial and widespread economic and social impact."[14]

A UAA lends itself to exploring the use of biological assessment (bioassessment) to assess the biotic integrity of EDWs to better characterize and manage these water bodies. Biological integrity is defined as a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of the natural habitat of the region. Bioassessment procedures have been developed and standardized over the last several

[12] 40 CFR 131.3(e)
[13] U.S.EPA. 1994. Water Quality Standards Handbook, Second Edition. This document can be found online at: http://www.epa.gov/ost/library/wqstandards/
[14] 40 CFR 131.10(g)

years to provide a measurement of the biotic integrity of wadable streams by assessing the benthic macroinvertebrate community. Use of biological information can help to more precisely define designated aquatic life uses and can eventually be used to develop biological criteria, which in turn can be used to guide water quality management decisions.

Net Environmental Benefit

One of the factors that states may use to remove or adopt a subcategory of a beneficial use is to demonstrate that *"human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place"*[15]. U.S.EPA Region 9 has interpreted this language to allow changes to beneficial use designations if it is shown that the ecological benefits of permitting the discharge to continue exceeds the ecological benefits of removing the discharge from the water body.

U.S. EPA Region 9 has developed guidance on "Modifying Water Quality Standards and Protecting Effluent-Dependent Ecosystems"[16]. The guidance focuses on existing methods that can be used to modify designated uses, water quality objectives and water quality-based effluent limits to better reflect conditions in the arid West.

The methods described in the guidance include:

(1) Total maximum daily load (TMDL) analysis.
(2) Alternate water quality criteria.
(3) Ecological benefit comparison (via use attainability analysis (UAA)).
(4) Economic feasibility analysis (via UAA).

The guidance introduces the concept of "net environment benefit" and "ecological benefit comparison". This concept looks at the ecological value of using effluent to support riparian and aquatic habitats and compares the benefit to that of removing the discharge from the water body. The guidance describes the conditions where a net environmental benefit will allow a designated use to be modified or removed. U.S. EPA recommends that the approach be applied to an entire watershed.

Six necessary elements of a net environmental benefit comparison are:

(1) Define ecological benefits and detriments.
(2) Construct a succinct description of the water body.
(3) Develop specific net environmental benefit comparison objectives and define expected performance.
(4) Establish a testable hypotheses and select statistical methods.
(5) Collect data and conduct specified analyses.
(6) Evaluate net environmental benefit and determine subsequent actions.

[15] 40 CFR 131.10(g)

[16] U.S. EPA, Region 9. 1992. Guidance for modifying water quality standards and protecting effluent-dependent ecosystems; and U.S. EPA, Region 9. 1993. Supplementary guidance on conducting use attainability analyses on effluent dominated ecosystems.

Site-Specific Objectives

States are required to adopt water quality criteria (termed water quality objectives in California) based on sound scientific rationale that contain sufficient parameters or constituents to protect the beneficial use. National water quality criteria for aquatic life may be under- or over-protective. For example, species at a site may be more or less sensitive than those included in the national criteria data set, or physical and/or chemical characteristics of a site could alter the biological availability and/or toxicity of the chemical. In these situations, site-specific objectives (SSOs) are allowed by regulation and are subject to U.S. EPA review. SSOs can be developed from any scientifically defensible method.

SSOs are water quality objectives and therefore must ensure the "reasonable protection of beneficial uses and the prevention of nuisance". Factors that shall be considered when establishing SSOs include:

(1) Past, present, and probable future beneficial uses of water.
(2) Environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto.
(3) Water quality conditions that could be reasonably achieved through the coordinated control of all factors which affect water quality in the area.
(4) Economic considerations.
(5) The need for housing within a region.
(6) The need to develop and use recycled water[17].

In making site-specific determinations about beneficial uses the following factors, at a minimum, need to be considered:

1) Which beneficial uses exist or have existed in the water body?
2) Which beneficial uses could potentially exist?
3) What kind of conditions and aquatic ecosystems are appropriate for EDWs?
4) For new discharges, a discussion of the beneficial uses associated with the ephemeral stream that is being replaced by a perennial effluent dominated stream.
5) What is the total length of stream impacted by the discharge (when do ambient conditions resume)?
6) What is the cumulative impact of these discharges?

Basin Plan

Porter-Cologne requires the Regional Boards to develop Water Quality Control Plans to establish water quality objectives and ensure the protection of beneficial uses.[18] These plans are based on watershed boundaries, or basins, and are therefore called Basin Plans. The Basin Plans adopted by Regional Boards contain descriptions of beneficial uses and identify water bodies where specific beneficial uses apply. Beneficial uses and associated WQOs for the Sacramento and San Joaquin Watersheds are described in the "*The Water Quality Control Plan for the California Re-*

[17] These requirements come from Porter-Cologne section 13241.
[18] Porter-Cologne, Section 13240

gional Water Quality Control Board Central Valley Region" (Basin Plan).[19] In the Basin Plan, specific beneficial uses are identified for about 100 surface water bodies. These include all the major rivers and lakes and the Delta.

Tributary Rule

There are thousands of tributaries to the major rivers of the Central Valley are not specifically listed in the Basin Plan. The Basin Plan states that the beneficial uses of any specifically identified water body generally apply to its tributary streams. This is called the tributary rule. In some cases, it may be appropriate to perform site specific analyses to refine the "blanket" assignment of beneficial uses – some of which may not or never have been attained.

Basin Plan Amendments

The beneficial uses which are assigned to individual streams can have a significant impact on the level of treatment needed and cost of treatment facilities. Currently, there is no simple process to address this issue, however the Basin Plan recognizes that in some cases a beneficial use may not be applicable to the entire body of water (i.e., unlisted tributaries). Beneficial use designations and water quality objectives can be changed through the Basin Plan Amendment (BPA) process.

Below is a summary of the steps taken to develop a BPA, and the amount of time needed to complete these steps:

1. Develop draft BPA and CEQA[20] Functional Equivalent Document (variable)
2. Scientific peer review (assume 60 days)
3. Respond to scientific peer review in staff report (assume 14 days)
4. Mail out staff report and associated documents/notice hearing (45 days minimum)
   - Begin formal comment period
   - Hold public hearing for additional comments

5. Respond to comments (14 days minimum)

6. Notice Board meeting and distribute response to comments (45 days minimum)

7. Board meeting to consider adoption of amendment
   - If adopted, then need approval of State Board and U.S. EPA
   - If not adopted, then staff could be redirected to revise aspects or abandon project

If Approved, then:

8. Submit amendment to SWRCB for approval
   - Notice Board workshop and comment period (45 day minimum)
   - Board workshop/close of comment period
   - Respond to comments (usually 14 days)

   - Notice Board hearing and distribute response to comments (45 days minimum)

[19] The full text of the Basin Plan can be found at: http://www.swrcb.ca.gov/rwqcb5/files.html
[20] California Environmental Quality Act (CEQA), see discussion below (in this section).

- Board hearing
  - If adopted, then on to OAL (approx. 42 days)
  - If approved to OAL, then to U.S. EPA (90 days)
    - Consultation with USFWS and/or NMFS (up to 135 days – but should be within U.S.EPA's 90 days)

Therefore, it is estimated that a minimum of 414 days are needed to complete the BPA process, after an acceptable draft BPA and CEQA Functional Equivalent Document has been presented.

Endangered Species

Federal ESA: Take Prohibitions and Critical Habitat

The purpose of the federal Endangered Species Act (ESA) is to protect plant and animal species that are in danger of extinction and to conserve their habitat.[21] The U.S. Fish and Wildlife Service (USFWS) is responsible for administering the ESA for terrestrial and freshwater aquatic species and migratory birds. The National Marine Fisheries Service (NMFS) is responsible for marine and anadromous species under the ESA. The ESA is a consideration in EDWs where an endangered species may be present. Regional Board staff have informally consulted with both the NMFS and the USFWS on this issue.

Under the ESA, limits on habitat alterations for endangered or threatened species stem from the concept of the "take" prohibitions in section 9(a) of the Act. As described by the NMFS[22]:

> *"Those section 9(a) prohibitions, in part, make it illegal for any person subject to the jurisdiction of the United States to take (including harass, harm, pursue, hunt, shoot, wound, kill, trap, or collect; or to attempt any of these), import or export, ship in interstate commerce in the course of commercial activity, or sell or offer for sale in interstate or foreign commerce any wildlife species listed as endangered, unless with written authorization for incidental take."*

NMFS has listed the Central Valley chinook salmon (*Oncorhynchus tshawytshca*) (spring run) and the Central Valley steelhead (*Salmo gairdneri gairdneri*) as a threatened species. The NMFS states that:

> *"… threatened chinook, coho, chum and sockeye are at risk of extinction primarily because their populations have been reduced by human ''take''. West Coast populations of these salmonids have been depleted by take resulting from harvest, past and ongoing destruction of freshwater and estuarine habitats, poor hatchery practices, hydropower development, and other causes."*

[21] The ESA is available online at: http://endangered.fws.gov/esa.html

[22] 64 FR 73479, December 30, 1999*Endangered and Threatened Species; Proposed Rules Governing Take of Threatened Snake River, Central California Coast, South/Central California Coast, Lower Columbia River, Central Valley California, Middle Columbia River, and Upper Willamette River Evolutionary Significant Units (ESUs) of West Coast Steelhead*

The NMFS issued a rule identifying Ecological Significant Units (ESUs) for salmon and steelhead and designating them as "critical habitat".[23] The critical habitat rule applies to all listed salmonid species that are indigenous to a particular ESA. This designation defines the geographical extent where "take" prohibitions will be regulated. The Central Valley is included in this critical habitat designation.[24]

The rule considers the following habitat types when making critical habitat designations:

> *"(1) juvenile rearing areas; (2) juvenile migration corridors; (3) areas for growth and development to adulthood; (4) adult migration corridors; and (5) spawning areas. Within these areas, essential features of critical habitat include adequate: (1) substrate, (2) water quality, (3) water quantity, (4) water temperature, (5) water velocity, (6) cover/shelter, (7) food, (8) riparian vegetation, (9) space, and (10) safe passage conditions."*

In response to concerns over critical habitat designations based on a watershed level (rather than more specific stream reaches), the NMFS had the following response:

> *"The agency's preferred approach to identifying critical habitat is to designate all areas accessible to the species within the range of hydrologic units in each ESU… NMFS clarifies that reaches or basins historically and currently unoccupied (e.g., Calleguas Creek, Ventura County, California) would not be considered critical habitat. Also, the agency acknowledges that some streams currently have little suitable habitat for salmon and steelhead or are rarely inhabited by the species. As noted previously, the paucity of detailed information regarding salmonid distribution precludes NMFS from identifying specific drainages or river reaches occupied by the species. In addition, the current low abundance of the species makes it difficult to rule out any stream for recovery since the remnant populations may need whatever habitat is available in order to persist… NMFS believes that the most prudent approach to characterizing critical habitat is to include all areas accessible to listed salmon and steelhead. In streams where there is limited species distribution information, NMFS biologists would make their best professional judgment about the access to and suitability of available habitat and what if any impacts would occur to the listed fish as a result of a specific activity. Few if any effects would result from an activity where it is well documented that the listed species makes little use of a river reach or basin and the existing habitat conditions are poor."*

Additionally, as required in section 4(d) of the ESA, the NMFS has issued rules defining the "take" prohibitions for threatened salmon and steelhead populations in the Pacific Northwest and

[23] 65 FR 7764, February 16, 2000 (Final Rule)*Designated Critical Habitat: Critical Habitat for 19 Evolutionary Significant Units of Salmon and Steelhead in Washington, Oregon, Idaho, and California*
[24] For information about listed salmonids and ESUs see: http://www.nwr.noaa.gov/1salmon/salmesa/specprof.htm

California. The rules apply to all listed salmon and steelhead populations in 14 "Evolutionary Significant Units" (ESUs), including the Central Valley ESU.[25]

These "4(d) rules" take a new approach towards regulating "take" of salmon and steelhead. The rules state that take prohibitions would be "limited" when a NMFS-approved program has been instituted. As long as these programs met protection criteria for the listed species, they would granted a "limit" by the NMFS and therefore be exempt from ESA take prohibitions. That is, once the NMFS has granted a limit to a particular program, the institutions directing these programs will not have to worry about violating the ESA take prohibitions. The 4(d) rules describe in detail several limits, including habitat restoration projects, forest practices rules and scientific research activities, which can be used as "standards" to evaluate other, similar programs. The NMFS proposes to work primarily with state and federal entities when granting limits. [26]

In regards to activities that may harm salmon but are already regulated by a state or federal agency, such as NPDES discharges, NMFS *"would not intend to concentrate enforcement efforts on those who operate in conformity with current permits. Rather, if the regulatory program does not provide adequate salmonid protection, NMFS intends to work with the responsible agency to make necessary changes in the program"*[27]. Therefore, since discharges to EDWs are regulated by NPDES permits, NMFS will work with the Regional Board to determine if permit limits are acceptable under the new 4(d) rules.

The critical habitat designations and take prohibitions for salmonids in the Central Valley will be an important consideration when developing permit requirements for EDWs. Since more than 80% of historical spawning habitat for threatened and endangered anadromous fish has been lost, marginal habitats have become increasingly important for the recovery these species. NMFS is concerned with protecting as much habitat as possible for Federally-listed salmonids, even marginal habitat that may be subject to opportunistic use only. Salmon and steelhead require cold water habitat conditions which may be difficult to achieve in EDWs, especially during the summer. Board staff have met with NMFS representatives to discuss this issue. Their primary concern is that the presence of high water temperatures (greater than 75°F) coupled with lack of hydraulic connectivity to downstream rivers during low flow periods may trap juvenile salmonids in a lethal environment.

Board staff has also met with representatives from the USFWS to discuss the issue of EDWs and endangered species. The USFWS is concerned that habitat alterations, primarily through increased flow, caused by the creation of new EDWs will cause harm to federally listed species such as the California red-legged frog (*Rana aurora draytonii*) by altering the existing ephemeral nature of the ecosystem (a discussion of the impacts of increased flow can be found in the section entitled "Benefical Use Protection" of this document). Another point brought up by USFWS is that habitat alterations may affect "species of concern" (species that are candidates for listing un-

[25] 65 FR 42422, July 10, 2000 (Final Rule)*Endangered and Threatened Species; Final Rule Governing Take of 14 Threatened Salmon and Steelhead Evolutionary Significant Units (ESUs)*

[26] For more information on these 4(d) rules see: *"A Citizen's Guide to the 4(d) Rule for Threatened Salmon and Steelhead on the West Coast"* available at: http://www.nwr.noaa.gov/1salmon/salmesa/4ddocs/citguide.htm

[27] 65 FR 42422, July 10, 2000 (Final Rule)*Endangered and Threatened Species; Final Rule Governing Take of 14 Threatened Salmon and Steelhead Evolutionary Significant Units (ESUs)*

der the federal ESA) such as the yellow-legged frog (*Rana muscosa*) or the California tiger salamander (*Ambystoma californiense*).[28]

The U.S. Fish and Wildlife give their formal review through an endangered species consultation with U.S. EPA. This occurs after the Regional Board, State Board, and Office of Administrative Law have acted on a project.

In some cases ESA listings for more than one species may result in conflicting habitat designations or beneficial uses. For example, the California red-legged frog is adapted to living in ephemeral streams. In perennial streams this species is may be displaced by the more aggressive bullfrog. Bullfrogs cannot survive during dry periods of ephemeral streams and the red-legged frog has a competitive advantage in these conditions. Where protecting red-legged frog habitat is a priority, it may necessary to manage a particular EDW as an ephemeral stream. However, converting a stream from ephemeral to perennial (as is often the case with EDWs) may provide habitat for endangered salmon or threatened steelhead (if other necessary criteria, such as temperature, were adequate).

California Endangered Species Act

The California Endangered Species Act is administered by the California Department of Fish and Game (DFG). It is similar to the federal ESA in that it mandates listings of threatened and endangered species and includes "take" prohibitions.[29]

Under CESA, state lead agencies[30] are required to consult with the DFG to ensure that any action it undertakes is not likely to jeopardize the continued existence of any endangered or threatened species or result in destruction or adverse modification of essential habitat. As an overriding consideration, the legislature identified that, in the event specific economic, social, or other conditions make infeasible such alternatives, individual projects may be approved if appropriate mitigation and enhancement measures are provided. In this instance, the state lead agency must:

(1) Require reasonable mitigation and enhancement measures to minimize the adverse impacts of the project on the endangered or threatened species or habitat essential to the continued existence of the species.
(2) Find that the benefits of the proposed project clearly outweigh the benefits of the project when implemented with the reasonable and prudent alternatives.
(3) Find that there has been no irreversible or irretrievable commitment of resources to foreclose the opportunity for formulating and implementing reasonable and prudent alternatives.[31]

[28] For more information about the USFWS & the ESA see: http://endangered.fws.gov/
[29] CESA can be found online at: http://ceres.ca.gov/topic/env_law/cesa/summary.html
[30] A "lead agency" is defined under the California Environmental Quality Act (CEQA) as the public agency which has principal responsibility for carrying out or approving a project that may have a significant effect on the environment. (Pub. Res. Code §21067)
[31] Fish and Game Code Sections 2032, 2053, and 2054.

California Environmental Quality Act

The California Environmental Quality Act (CEQA) is the state law that governs environmental protection in California.[32] The objectives of CEQA are to: *"disclose to decision makers and the public the significant environmental effects of proposed activities, identify ways to avoid or reduce environmental damage, prevent environmental damage by requiring implementation of feasible alternatives or mitigation measures, disclose to the public reasons for agency approvals of projects with significant environmental effects, foster interagency coordination in the review of projects, and enhance public participation in the planning process"*.[33]

The Secretary of the Resources has certified certain state regulatory programs, exempting them from CEQA's requirements to prepare Environmental Impact Reports (EIRs) and Negative Declarations. The Basin Planning program of the Regional Board is one such program. A certified program, however, remains subject to other provisions of CEQA, such as the requirement to avoid significant adverse effects on the environment where feasible. To qualify for this exemption, which is based on the theory that one of the agency's purposes is to protect the environment, the program requires preparation of a Functionally Equivalent Document (FED) that must include several specific environmental protection requirements.

Migden Law

The recent passage of Clean Water Enforcement and Pollution Prevention Act of 1999(CWC)[34], also referred to as the "Migden Law", has significantly tightened Board regulatory action in regards to NPDES permit violations. Sections 13385(h), (i), and (j) of the CWC provide for mandatory minimum penalties of $3,000 per violation. In these cases the Board has no discretion to forgive permit violations and fines must be assessed whenever a discharger is out of compliance. This development has strengthened dischargers concerns over effluent limits that they consider to be unnecessarily stringent.

Recent proposed revisions to this law would allow for the adoption of time schedules in Cease and Desist orders for new effluent limits that would not require the $3,000 daily fines. However, no proposed revisions have been adopted to date.

BENEFICIAL USE PROTECTION

Permit requirements under the NPDES program must be fully protective of the beneficial uses assigned to a particular water body. As discussed above, beneficial use designations in EDWs made through the tributary rule are often controversial. In many cases there is insufficient data to make an appropriate decision.

[32] Information about CEQA is available online at: http://ceres.ca.gov/ceqa/

[33] Bass Ronald E. 7 Albert I. Herson, 1994 *"Successful CEQA Compliance: A Step-by-Step Approach Third Edition"* Solano Press Books

[34] SB 709; For more information see: http://www.swrcb.ca.gov/news/index.html

Ecological Factors to Consider

EDW Categories

As listed in Table 1 of the Appendix, Board staff have identified 50 existing EDWs, one proposed EDW (the City of Lincoln), and one recently permitted facility that has yet to be constructed (Pleasant Grove WWTP) in the Sacramento and San Joaquin watersheds. These EDWs fall roughly into four types; sierra creeks, foothill creeks, valley drains and valley sloughs. Sierra and foothill creeks tend to have gravel substrate, relatively well-defined pool and riffle habitats, and a steeper gradient. Valley drains and sloughs have less gravels, more sediment, warmer waters and a shallower gradient. They are often highly modified and frequently also influenced by agricultural drainage. In the Sacramento and San Joaquin watersheds there are 26 EDWs in sierra or foothill creeks and 21 in valley drains or sloughs. The remaining 3 water bodies are either delta tributaries or reservoir tributaries.

Endangered Species

One of the beneficial use designations identified in the Basin Plan is the RARE beneficial use which is defined as "*Uses of water that support aquatic habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened or endangered*". To date, none of the water bodies identified in the Basin Plan have been designated with the RARE beneficial use. However, this may become a consideration in EDWs that have been designated critical habitat for under the Endangered Species Act (such as the Central Valley Ecologically Significant Unit for salmon and steelhead).

Existing EDWs: Current vs. Historical Conditions and Beneficial Uses

In many EDWs, discharge has continued for many years and true historical (pre-discharge) data are unavailable. In many cases the discharge has created a “new” ecosystem with beneficial uses associated with it, such as irrigation, recreation or a year-round warm water fishery. Discontinuing discharge may interfere with water rights decisions and drastically alter the created beneficial use. Furthermore, many of these water bodies have been heavily impacted by other sources, such as dams, irrigation diversions, urbanization, etc., and the re-establishment of true historical conditions would be unattainable or undesirable, even with the cessation of discharge.

There are several ecological questions to consider when evaluating an existing EDW:

- What were the aquatic life uses associated with the water body prior to discharge of effluent?
- Can the original uses be fully or partially maintained with the effluent present?
- What kind of aquatic life uses are currently associated with the effluent?
- How long has the water body been dominated by effluent?

It will be necessary to include this type of evaluation in any policy developed to address EDWs.

New EDWs: Consequences of Increased Flow

The past and current approaches to protect water resources have focused on evaluating impacts by conducting extensive chemical laboratory analyses. This approach assumes that clean water, as determined by chemical specific parameters, produces high quality water resources. In EDWs, high quality water is not the only issue. Increased flow and altered flow regimes are important factors as well. The consistent increased flows provided by wastewater discharge may enhance

some aquatic life beneficial uses. On the other hand, these discharges can be detrimental to species that respond to the ephemeral nature of the stream.

Increased flows may enable the formation of in-stream habitat suitable for the establishment of aquatic species and riparian habitat that can support a wide variety of wildlife. For example, perennial flow will support a year round fishery that would not exist if the stream dried up every summer.

In some cases, the natural, pre-discharge habitat may be altered for some key features that make the stream unsuitable for formerly indigenous species. Many species of amphibians, such as the threatened California red-legged frog are adapted to periodic drying and ephemeral streams are their natural habitat. When water flow is continued throughout the year this species is subject to competition from the more aggressive bullfrog, which requires perennial stream conditions.

Year-round or increased flow raises the water table and can contribute to the growth of new riparian vegetation such as cottonwoods and willows. Although riparian vegetation is usually considered beneficial, in certain cases an elevated water table and subsequent vegetative growth can increase the likelihood of flooding. If the elevated water table intersects with a vernal pool, it will remain wet throughout the year, wiping out important habitat. Increased flow can also alter stream morphology and contribute to streambed degradation, down-cutting and bank erosion.

In short, altering the natural flow regime will have many consequences that should be evaluated fully before the decision to allow a new EDW is made. Some of this evaluation will be made under the auspices of the Endangered Species Act.

Net Environmental Benefit

Where conflicting demands such as new vs. historical beneficial uses, ephemeral vs. perennial conditions, and protection of endangered species habitat arise in an EDW, a net environmental benefit analysis may be the most appropriate method for determining a course of action. For example, in order to provide a coldwater habitat for listed salmonids throughout the year, a wastewater treatment plant may be able to restore habitat downstream or provide an alternate source of cold water during the warm summer months. Or, if it is determined that ephemeral conditions are the most desirable for a particular water body, the facility may be able to discontinue all discharge during the summer by selling the reclaimed water for irrigation. The key to this process will be to work with all stakeholders (facility owners, government agencies, local community members, environmental organizations, etc.) to develop a solution that will provide greatest environmental benefit.

Approaches

The following general approaches have been suggested in various public forums for staff to consider for addressing EDWs.

- Dischargers should examine land-disposal alternatives for wastewater disposal prior to allowing a discharge to surface water. The Regional Board and state policy encourages the reclamation and reuse of wastewater where practicable and requires as part of a Report of Waste Discharge an evaluation of reuse and land disposal options as alternative disposal

methods. Where studies show that year-round or continuous reuse or land disposal of all of the wastewater is not practicable, the Regional Board will require dischargers to evaluate how reuse or land disposal can be optimized, such as consideration of reuse/disposal for part of the flow and seasonal reuse/disposal options.

- Dischargers can achieve the existing chemical specific water quality objectives through treatment facility upgrades or source control within the collection system. This can be extremely expensive and dischargers question the benefits to water quality and beneficial uses. For some constituents, compliance may not be technologically possible. Physical, biological and hydrological features still need to be addressed.

- Dischargers can consider discontinuing the discharge of effluent to the stream. Before reducing or eliminating a discharge of wastewater to surface water, permission must first be obtained from the State Water Resources Control Board. Section 1211 of the California Water Code requires that "prior to making any change in the point of discharge, place of use, or purpose of used or treated wastewater, the owner of any wastewater treatment plant shall obtain approval of the [State Water Resources Control] Board for any such change." The primary purpose of this requirement is to assure that downstream water diverters, who may be dependent upon the wastewater flow as part of their water supply, are not adversely impacted by the change in wastewater disposal practices. Increased levels of treatment may be required to protect the beneficial uses of the water body. Discontinuing the discharge will likely change the habitat of the receiving water. Therefore, a question to consider is whether removal of the effluent would cause more environmental damage than allowing it to continue.

- Site-specific evaluations can be conducted. In some cases, site-specific evaluations may conclude that some beneficial uses currently specified in permits or the Basin Plan are not appropriate. Most EDWs have not had site-specific studies completed to identify existing and potential beneficial uses. In the absence of the site-specific studies, uses are assumed to be the same as that for the downstream tributary (through the tributary rule), however many dischargers feel that a more refined approach is necessary, and are willing to dedicate resources to assist with these evaluations. New beneficial use designations, or changes to beneficial use designations, cannot be made during the permit adoption process; rather they can only be performed through the Basin Plan Amendment process. U.S. EPA has indicated that changes in beneficial uses will also trigger a UAA analysis. Site-specific water quality objectives or new beneficial use designations may be appropriate for some water bodies. In addition, application of the narrative criteria (no toxics in toxic amounts) requires consideration of site-specific information, where available, in determining whether or not the environment is protected (see 40 CFR Part 122.44 (d)). State and federal regulations provide the framework and guidance for developing site-specific objectives and for changing beneficial uses.

- Provisions for granting variances can be developed. The basic principles of water quality standards variance are that (1) the non-attainment of standards be minimized; (2) progress toward attaining standards be achieved where possible; and (3) the dischargers must meet the standard upon expiration of the variance. The current Basin Plan contains provisions

for time schedules in permits to achieve compliance with water quality objectives that were adopted after September 25, 1995.

Current Status

The Regional Board has adopted more than 50 permits for discharges of treated municipal wastewater into ephemeral or low flow water bodies. In developing permit limits, staff must determine what beneficial uses need to be protected and what water quality objectives are applicable. Because EDW have limited dilution capacity, effluent limits are usually set equivalent to water quality objectives (e.g., numerical objectives contained in the Basin Plan, numerical standards included in the California and National Toxics Rules, U.S. EPA water quality criteria, or other applicable criteria) established to protect the most sensitive beneficial use. Dischargers often have difficulty meeting these water quality objectives in undiluted effluent. In addition, the objectives for turbidity, temperature, and pH are often violated because they are based on allowing only limited changes from background conditions. Background stream conditions typically fluctuate, are more sensitive, and respond more quickly to environmental changes (i.e., rainfall, changes in air temperature) than effluents from wastewater treatment facilities.

Discharger concern about meeting stringent permit limits is one factor that has focused attention on EDWs In order to address individual discharger concerns, it may be necessary to take a broad, comprehensive approach that allows for maximum flexibility in determining net environmental benefit.

One of the major obstacles staff faces when dealing with EDWs is a lack of data to make appropriate decisions. There is a need for comprehensive monitoring and assessment programs to answer many of the ecological questions and approaches mentioned in this section. In an effort to address this issue staff is considering using AB 982 funds[35] for a monitoring project in Placer County, where several foothill and sierra creek EDWs are located.

PARAMETERS OF CONCERN TO DISCHARGERS

Dischargers contributing flows to ephemeral or low flow streams have often had difficulty meeting prescribed effluent limits that are consistent with U.S. EPA criteria because, where there is little dilution available, discharge limits are often set equivalent to the criteria for the receiving waters. The effluent limits that have most often proven difficult to meet in typical discharges to EDWs from municipal wastewater treatment plants include: copper, zinc, arsenic, pesticides, chronic toxicity, bacteria, disinfection by-products from dechlorination, and various organic compounds.

Another problem for dischargers is difficulty meeting receiving water that are set to allow only small fluctuations from background conditions. Parameters in this category include turbidity, temperature, dissolved oxygen, bacteria, and pH. Background conditions in streams typically

[35] AB 982 initiated a statewide Surface Water Ambient Monitoring Program. More information about AB 982 can be found at: http://www.swrcb.ca.gov/ab982/index.html

fluctuate more quickly than effluents. Occasionally background conditions may actually be outside the range of acceptable water quality criteria and, pursuant to Basin Plan language, a compliant discharge that corrects the condition may be deemed in violation of the receiving water limit. In such cases effluent limits may be preferable to receiving water limits.

Dischargers have also expressed concern regarding the derivation of ammonia and nitrogen limitations and applications of dissolved oxygen criteria for waters that have seasonal cold water fisheries. While sensitive organisms may only be present for part of the year, permits are often written assuming their presence on a year-round basis.

The following parameter discussion will help illustrate the issues associated with EDWs:

Toxic Chemicals

The Regional Board typically used U.S. EPA water quality criteria for toxic chemicals to establish receiving water limits for NPDES permits for protection of aquatic life. Now, many of the toxic chemicals are included in the California Toxics Rule[36]. In EDWs, because of the lack of dilution water, effluent limits often have to be set that are equivalent to the U.S. EPA criteria. Many facilities have difficulty meeting these stringent limits and question whether these limits are necessary to protect beneficial uses.

Turbidity

Turbidity is a measure of the clarity of water. When suspended particles are present in water, light is scattered and the water appears less clear or turbid. Measurement of turbidity is accomplished by determining light transmission using a standard light source. The test is a surrogate for determining relative levels of suspended and settable solids that are in the water column. The turbidity of water affects municipal, industrial, recreational, and aquatic life beneficial uses.

In the original 1975 adoption of the Basin Plan, the turbidity objective in Jackson Turbidity Units (JTU) was *"Where natural turbidity is between 0 and 50 units, increase shall not exceed 20 percent. Where natural turbidity is between 50 and 100 JTU, increases shall not exceed 10 JTU. Where natural turbidity is greater than 100 JTU, increases shall not exceed 10 percent."* In 1988 amendments to the Basin Plan, the units were changed to NTU (Nephelometric Turbidity Units). One NTU is approximately equal to one JTU. This amendment did not change the objective significantly. In 1994, the objective was amended in two ways, both in response to input from dischargers. First, where natural turbidity is between 0 and 5 NTUs, increases shall not exceed 1 NTU. This was a relaxation to the existing objective. The second change was to add language that *"appropriate averaging periods may be applied provided that beneficial uses will be fully protected"*. Part of the rationale for the original objective and subsequent revisions was to avoid significant changes in water quality. This is consistent with state and federal antidegradation provisions that have been previously mentioned.

[36] 65 FR 31682, May 18, 2000 *Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California*

In addition to coliform testing, turbidity can be used as an indicator of the effectiveness of treatment processes for pathogen removal in WWTPs. Failure of the filtration system such that pathogen removal is impaired would normally result in increased particles in the effluent, which would result in higher effluent turbidity. Turbidity has a major advantage for monitoring filter performance, allowing immediate detection of filter failure and rapid corrective action. Coliform testing, by comparison, is not conducted continuously and requires several hours to days to identify high coliform concentrations. The Department of Health Services (DHS) is, therefore, interested in turbidity levels of effluent, especially in the case of EDWs where contact recreation may occur in undiluted effluent. In this case, the turbidity limit for effluent is set at the same level as recommended by DHS which is a daily average of 2 NTUs and a maximum of 5 NTUs.[37]

Dischargers have maintained that, especially at the lower end of the range, the objectives for receiving waters are too stringent. The issue for dischargers is that during low flow periods receiving waters can have very low turbidities (less than 1 NTU). During these times it is difficult for them to meet the Basin Plan objectives that effluent should not change turbidity by more than 1 NTU when receiving water turbidity is 0-5 NTUs. In this case the Basin Plan is more stringent than the DHS effluent requirements.

Staff is considering developing a BPA for turbidity which would state that, for WWTPs with tertiary treatment, effluent turbidity must meet a 2 NTU average with a 5 NTU maximum during the periods when receiving water is in the range of 0-5 NTUs. Staff has consulted with both DHS and DFG to discuss this modification to the Basin Plan objectives for turbidity and staff from both agencies have indicated that such changes would be acceptable to them.

Temperature

North American fishery managers have long recognized the importance of temperature in determining fish distribution and have divided the fluvial world into warm-water and cold-water streams. Temperatures in fresh surface waters of the temperate zone are usually within a range from the freezing point to 30^{o}C (86^{o}F). There are streams in mountains or wooded regions where temperatures seldom exceed 20^{o}C (68^{o}F). The species present in a given aquatic community are largely determined by the temperature regime.[38] Warm-water streams have temperatures that exceed 24^{o}C to 26^{o}C (75^{o}F-79^{o}F) for extended periods of time and are characterized by smallmouth bass, green sunfish, catfish, and a diversity of small fishes, especially cyprinids and darters, while cold-water streams rarely exceed 24^{o}C to 26^{o}C (75^{o}F-79^{o}F) and are characterized by trout and sculpins[39].Temperature changes in water bodies can alter the existing aquatic community through changes in interspecies relationships.

Temperature is important for anadromous species, such as the Chinook salmon or steelhead. They require cold-water streams during spawning and early life cycle stages. This will pose a problem for EDWs located in designated "critical habitat" for Chinook salmon and steelhead

[37] 22 CCR §60301.320 Proposed Regulations for Water Recycling

[38] Sprague, J.B. 1985. Factors that modify toxicity. *In*: Fundamentals of Aquatic Toxicology, Methods and Applications. Gary M. Rand and Sam R. Petrocelli, editors. Hemisphere Publishing Corp. New York.

[39] Moyle, Peter and Joseph Cech, Jr. 1988. Fishes. An Introduction to Ichthyology. Second Edition. Prentice Hall, Englewood Cliffs, New Jersey.

(please see the "Endangered Species Considerations" sub-section in the "Applicable Water Quality Laws and Regulations" Section of this document for further discussion of this issue).

Through the natural changes in climatic conditions, the temperature of water bodies fluctuates daily as well as seasonally. These changes do not eliminate indigenous aquatic populations, but affect the existing community structure and the geographic distribution of species. In certain cases, such temperature changes are necessary to induce the reproductive cycles of some aquatic organisms and to regulate other life factors.

The body temperatures of most aquatic organisms are at the same temperature as the water, and there are upper and lower lethal temperatures beyond which they cannot survive. Many fish seem to have an upper lethal temperature that is at least $5^{o}C$ ($9^{o}F$) higher than the maximum usually encountered in their habitat. Temperature can have profound effects on metabolic processes, reproduction, growth efficiency, and the performance of various activities. Increased temperature can also increase the solubility of many substances, influence the chemical form of some, and govern the amount of oxygen dissolved in the water. Such changes can interact with the direct deleterious effects of elevated temperature[40].

Temperature also affects the self-purification phenomenon in water bodies and therefore the aesthetic and sanitary qualities that exist. Increased temperatures accelerate the biodegradation of organic material both in the overlying water and in bottom deposits which makes increased demands on the dissolved oxygen resources.

The current Basin Plan has specific temperature objectives for the mainstem Sacramento River and in the Delta. For inland surface waters the Basin Plan states: … *At no time or place should the temperature of COLD or WARM intrastate waters be increased more than $5^{o}F$ above natural receiving water temperatures*. The Basin Plan indicates that in determining compliance with the objective, appropriate averaging periods may be applied provided that beneficial uses will be fully supported. The rational for this temperature objective is to prevent significant detrimental changes in water quality. This is consistent with state and federal antidegradation provisions.

In EDWs the temperature of effluent is relatively constant compared to the background temperatures of small creeks, which fluctuate with air temperature. Dischargers have maintained that the minimum $5\ ^{o}F$ increase is too stringent.

The beneficial use designations of the water body are also a concern of dischargers. Many EDWs are designated as both WARM and COLD by the tributary rule. It may be difficult for some dischargers to maintain the temperature objectives of COLD beneficial use, especially during the warm summer months. In some cases dischargers are arguing that the COLD designation through the tributary rule is inappropriate based on current conditions (e.g. The presence of a warmwater fishery as a result of effluent discharge). However, many EDWs have been identified as critical habitat for threatened or endangered anadromous fish, which require coldwater systems (please see the "Endangered Species Considerations" sub-section in the "Applicable Water Qual-

[40] Sprague, J.B. 1985. Factors that modify toxicity. *In*: Fundamentals of Aquatic Toxicology, Methods and Applications. Gary M. Rand and Sam R. Petrocelli, editors. Hemisphere Publishing Corp. New York.

ity Laws and Regulations" Section of this document for further discussion of this issue). It may therefore be appropriate to develop seasonal temperature objectives that would appropriately support the coldwater species when they may be present.

Dissolved Oxygen

The distribution and abundance of freshwater aquatic life is greatly influenced by the amount of dissolved oxygen present in the water. Some species can tolerate fairly low levels of dissolved oxygen while other species cannot. Low oxygen levels impact survival, growth and behavior of aquatic organisms, and, by providing stress, can reduce resistance to diseases and other stresses. Oxygen levels occurring in natural water bodies can be reduced by addition of oxygen using substances which are present in effluent from waste water treatment plants and in discharges from diffuse nonpoint sources.

The current Basin Plan has dissolved oxygen limits that are specified in portions of the mainstem Sacramento, Feather, Merced and Tuolumne Rivers and in the Delta. For the rest of the Region the following general objective applies:"… *the monthly median of the mean daily dissolved oxygen (DO) concentrations shall not fall below 85 percent of saturation in the main water mass, and the 95 percentile concentration shall not fall below 75 percent of saturation. The dissolved oxygen concentrations shall not be reduced below the following minimum levels at any time: Waters designated WARM 5.0 mg/l; Waters designated COLD 7.0 mg/l; Waters designated SPWN 7.0 mg/l"*[41]. The Delta objectives have been recently revised. The rest of the objectives have been in place since the Basin Plan was originally adopted in 1975. A key consideration in the development of the dissolved oxygen objectives was to try to limit degradation from historical levels. Dischargers have expressed two general concerns. First, the determination of whether a water body should be protected as warm water habitat or cold water habitat is critical to dischargers. The difference between achieving 5 mg/l and 7 mg/l is significant. Since most of the main rivers in the region are designated as supporting both COLD and WARM water habitat the tributary rule requires that, absent specific designation, these beneficial uses apply to the tributaries. Therefore, most dischargers end up having to meet the 7 mg/l limit in their permits. The second concern that dischargers have suggested is that the existing water quality objectives may be too stringent.

pH

pH is an important factor in the chemical and biological systems of natural waters. Aquatic organisms operate within a range of pH. Outside of this range, the organism suffers deleterious affects. pH shock is an acute physiological effect that occurs to aquatic organisms within hours as a result of a sudden change in pH. Furthermore, the toxicity of many compounds is affected by the pH.

The current Basin Plan language (p. III-5 and III-6) is: *"the pH shall not be depressed below 6.5 nor raised above 8.5. Changes in normal ambient pH levels shall not exceed 0.5 in fresh waters with designated COLD and WARM beneficial uses. In determining compliance with the water*

[41] *The Water Quality Control Plan (Basin Plan) for the California Regional Water Quality Control Board Central Valley Region*, Fourth Edition 1998. The full text of the Basin Plan can be found at: http://www.swrcb.ca.gov/rwqcb5/files.html

quality objective for pH, appropriate averaging periods may be applied provided that beneficial uses will be fully protected. For Goose Lake (2), pH shall be less than 9.5 and greater than 7.5 at all times."[42] This recommendation parallels that cited in Sprague[43], which refers to the NAS/NAE proposed levels.

U.S. EPA recommends the following criteria:

5-9: for domestic water supplies
6.5-9.0: for freshwater aquatic life
6.5-8.5: for marine aquatic life.

Some dischargers argue that the language in the Basin Plan requiring that the change in pH not exceed 0.5 pH units in fresh waters designated with COLD or WARM beneficial use is unnecessarily stringent.

Staff is considering proposing a BPA which would remove the language stating that pH could not change by more than 0.5 pH units. The discharger would not violate the objective for pH as long as the receiving water stayed within the 6.5 – 8.5 range.

Bacteria

Many Americans risk illness from exposure to contaminated recreational waters. While there is no true measure of the magnitude of disease associated with recreational water exposures, epidemiological studies in the United States and abroad have consistently found an associated disease burden. Nationally, thousands of beach advisories and closings are issued at recreational rivers, lakes, and oceans every year. These advisories and closings are generally due to elevated levels of indicator organisms which may indicate the presence of pathogens, disease-causing microorganisms. Indicator organisms are used to assess the sanitary quality of water, because human pathogens in surface waters are too numerous and too difficult to assess on a routine basis. Two types of commonly used indicator organisms are fecal coliform and total coliform. Fecal coliform is less resistant to disinfection than most water borne pathogens and less resistant than total coliform. Thus, it is possible for treated effluent to have low levels of fecal coliform while having levels of pathogens which are of public health concern. The more resistant total coliform organisms are better indicators of the pathogenic quality of water.

The water quality objectives currently in the Basin Plan for contact recreation were developed based on U.S. EPA guidelines established in 1976. These guidelines were based on observations of detectable health effects at concentrations of 2,300 to 2,400 coliform organisms per 100 ml, which were translated to a fecal coliform concentration of 200/100 ml including a safety factor. U.S. EPA health effect studies conducted since adoption of the guidelines found evidence of gastrointestinal illness associated with waters meeting the U.S. EPA standard and which contained low levels of indicator organisms E. coli and enterococci. The increased illness rates due to ingestion of between 10 to 50 ml of water were calculated at 8/1,000 swimmers. The U.S. EPA

[42] The full text of the Basin Plan can be found at: http://www.swrcb.ca.gov/rwqcb5/files.html
[43] Sprague, J.B. 1985. Factors that modify toxicity. *In*: Fundamentals of Aquatic Toxicology, Methods and Applications. Gary M. Rand and Sam R. Petrocelli, editors. Hemisphere Publishing Corp. New York.

has since recommended that states adopt an enterococcus or E. coli standard for freshwater based on studies from the Great Lakes and East Coast. Specifically, the 1986 criteria document[44] recommends a bacteria standard for freshwater, based on a statistically sufficient number of samples (generally not less than 5 samples equally spaced over a 30-day period), of the geometric mean of the indicated bacterial densities should not exceed an E. coli level of 126 per 100 ml or Enterococci level of 33 per 100 ml.

In March of 1999, U.S. EPA released an Action Plan for Beaches and Recreational Waters that called for states and tribes to strengthen their beach and recreational water quality standards by adopting the 1986 ambient water quality criteria for bacteria and make the transition to monitoring for its recommended E. coli and enterococci indicators, rather than total coliforms or fecal coliforms, by October 2003. Where a state does not amend its water quality standards to include the 1986 criteria, U.S. EPA will act under Section 303(c) of the Clean Water Act to promulgate the criteria with the goal of assuring the 1986 criteria apply in all states not later than 2003[45].

In California, the Department of Health Services (DHS) has the responsibility of establishing minimum standards for the sanitation of public beaches. The DHS has prepared draft guidance for Freshwater Beaches to assist local health agencies with regard to the sanitation and healthfulness of recreational waters and beaches.[46] It includes guidance for developing a protocol for recreational waters, a discussion of recommended levels of contamination for public notification and beach closure, levels for reopening closed beaches, suggested language for public notification, and other recommendations related to beach cleanliness. It also includes a review of present state and federal guidance and standards. The guidance does not include a bacterial standard for the protection of public health for contact recreation in streams which are subject to discharges of waste water. However, DHS has adopted regulations for the use of reclaimed water including its use for supply of unrestricted recreational (body contact) impoundments. The focus of the regulations is with the protection of public health and with regards to supply for unrestricted recreational impoundments considers the potential for ingestion.

In drafting effluent limits for contact recreation for National Pollution Discharge Elimination System (NPDES) permits, the Regional Board consults the DHS on a case-by case basis. This consultation is undertaken because DHS has the responsibility for protecting public health and because DHS has not adopted regulations for the discharge of wastewater to surface waters. The reclamation regulations that are found in Title 22, Division 4 of the California Code of Regulations generally form the basis for the recommendation that DHS provides the Regional Board. DHS takes into consideration the amount of available dilution in the receiving water in providing recommendations to the Regional Board. However, the focus of the reclamation regulations is on providing adequate treatment to remove pathogenic organisms to protect human health from ingestion.

Section 60315 of these regulations outline the treatment requirements for the use of reclaimed water as source for unrestricted recreational impoundments. The treatment requirements include

[44] U.S. EPA. 1986. Ambient Water Quality Criteria for Bacteria - 1986. EPA 440/5-84-002.
[45] U.S. EPA. 1999. Action Plan for Beaches and Recreational Waters. EPA/600/R-98/079.
[46] DHS. 1999. Draft Guidance for Fresh Water Beaches.

adequate disinfection, oxidation, coagulation, clarification, and filtration. Adequate disinfection is defined as wastewater which has a median number of coliform organisms that does not exceed 2.2 per 100 ml. and the number of coliform organisms does not exceed 23 per 100 ml. in more than one sample within any 30-day period. The median value is determined from the bacteriological results of the last seven days for which the analyses have been completed. Coagulation, clarification and filtration remove virus and parasites which are not readily susceptible to chlorination. For reclaimed water to be used as a source supply for a restricted recreation (non-body contact) impoundment, the regulations specify treatment to include adequate disinfection and oxidation where adequate disinfection is defined as wastewater containing a median number of coliform organism that does not exceed 2.2 per 100 ml. No maximum value is specified for restricted recreation.

Some dischargers question the appropriateness of setting effluent limits in NPDES permits based on values which have not been formally adopted by the Regional Board through a Basin Plan Amendment process or for using limits which have not been formally adopted into state regulations. During the Basin Plan Triennial Review, Regional Board staff recommended that, for clarity purposes, we should request that the DHS adopt disinfection regulations for contact recreation and the Regional Board adopt these regulations by reference into the Basin Plan. There are significant costs associated with effluent limits based on DHS recommendations and dischargers have suggested that the effluent limits exceed Basin Plan requirements or the yet-to-be adopted U.S.EPA 1986 criteria.

EFFORTS TO ADDRESS EDWs

Attempts are being or have been made in regulatory plans and policies to recognize the unique nature of water bodies in the arid and semi-arid west. The background presented below describes these attempts on a regional, state and federal level.

Region 5 Staff Efforts

Over the past year staff has prepared this report and a presentation to the Regional Board (given on August 4, 2000) on EDWs in the Central Valley. In researching this issue, staff consulted with representatives from state and federal agencies, discharger groups and environmental groups.

Board staff have been working with the El Dorado Irrigation District (EID) to resolve permit compliance issues with their wastewater treatment plant at Deer Creek, an EDW. On March 16, 2000 the Board adopted Cease and Desist Order (C&D) No. 5-00-033 which gave EID a time schedule to comply with effluent limitations. The Board directed staff to work with the EID on this issue, and EID is providing funding for staff efforts. EID is asking for site specific Basin Plan Amendments (BPA) for pH, turbidity and temperature. Work is proceeding according to the compliance schedule specified in the C&D, and draft BPAs for pH, turbidity and temperature are expected in September. The results of this effort may result in basin-wide amendments for turbidity and pH. This process with EID has helped to reveal some of the major difficulties associated with permit requirements in EDWs, including beneficial use designations through the tributary rule and Endangered Species Act considerations for anadromous salmonids.

A lack of applicable data to effectively address this issue is becoming evident. Staff is considering using AB 982 funding[47] to develop a monitoring and assessment program for EDWs in Placer County. Several dischargers in this county (Roseville, Placerville, Lincoln, Auburn, and Placer County) have expressed their interest in working with Board staff to address EDWs in their jurisdiction. This project is discussed further in the "Options" section below.

Statewide

Statewide Plans For Inland Surface Waters And Enclosed Bays And Estuaries

The now rescinded Inland Surface Waters Plan (ISWP) and Enclosed Bays and Estuaries Plan (EBEP)[48] identified new categories of water bodies. "Category A" water bodies were considered to be "water bodies, or segments thereof, that are not naturally perennial and, as of the date of adoption of this plan, support, or are planned to support within six years of plan adoption, aquatic habitat beneficial uses during the dry season as a result of discharge of reclaimed water."

The plans included specific provisions for addressing EDWs. For the purposes of regulating reclaimed water and non-point source discharges, the statewide numeric, chemical specific, water quality objectives were to be applied as performance goals. Site-specific objectives were to be developed within six years for constituents in these water bodies for which the statewide water quality objectives were determined to be inappropriate. If, after the six years, site-specific objectives had not been developed and adopted, the statewide objectives would apply. In addition, point source discharges that were not reclaimed water had to meet the statewide objectives upon plan adoption. The U.S. EPA formal action on these plans included disapproval of the categorical water body approach. Specifically, the U.S. EPA objected to the absence of numeric standards applicable to these water bodies during the six-year period when site-specific objectives were being developed.

Effluent Dependent Water Body Task Force

In the court decision invalidating the ISWP and EBEP, the court directed the State Water Resources Control Board to develop and adopt new plans. To assist with the development of these plans, State Board staff assembled task forces to address issues that were included in the rescinded plans. One of these issues was effluent dependent water bodies.

The Effluent Dependent Water body Task Force met six times and produced a report detailing the discussions held and decisions reached in their meetings. The Task Force recommended establishing several new categories and subcategories for several existing beneficial uses. Under this scenario, it would also be necessary to establish water quality objectives to support the new beneficial uses.

[47] AB 982 initiated a statewide Surface Water Ambient Monitoring Program. More information about AB 982 can be found at: http://www.swrcb.ca.gov/ab982/index.html

[48] These plans were originally adopted in 1991. In 1994, the State Water Resources Control Board rescinded these plans in response an adverse ruling by the Sacramento County Superior Court (Water Quality Control Cases, Judicial Council Coordination Proceeding No. JC 2610).

Currently, State Board staff has completed Phase I of a three-phase plan to readopt a new ISWP and EBEP. Phase I of the plan was to develop an implementation plan for the California Toxics Rule. Recommendations from the Effluent Dependent Water body Task Force are scheduled to be addressed in Phase II. In the original schedule, all three phases were to be completed by the year 2000. Due to the complexity of issues, the timeline for the schedule has been exceeded. A new timetable for the three-phased plan has not been released. A lawsuit filed on May 31, 2000 by several California environmental organizations to strengthen pollution permit requirements under the California Toxics Rule may further delay this process.

Federal

Recently, U.S. EPA has provided funding for an Arid West Water Quality Research Project[49], because the national aquatic life criteria have been developed for aquatic species that are not representative of the species important to ephemeral and effluent dependent streams. The project represents an opportunity for entities throughout the arid and semi-arid west to work together to conduct the scientific research necessary to develop appropriate water quality criteria for the arid and semi-arid West and to improve the scientific basis for regulating water quality for effluent and storm water discharges for the arid and semi-arid West. The research will be designed to produce results that will protect the species and habitats characteristic of ephemeral and effluent-dependent stream ecosystems. The Central Valley is not within the scope of this study. However, as average precipitation for much of the San Joaquin River watershed qualifies the area as "arid" (<12"/year) pursuant to the stated defining characteristics of the study area, the results may be ultimately relevant to our efforts.

OPTIONS

This section discusses three options for addressing the issues associated with EDWs. Staff has considered the approaches discussed earlier and developed several alternatives (or options) for addressing discharger concerns, while at the same time protecting beneficial uses. Strengths and weaknesses associated with each alternative are discussed.

Staff evaluated the options using the following criteria to arrive at a staff recommendation:

1) Will beneficial uses be protected?
2) Will concerns of discharger community be addressed to the maximum extent practicable?
3) Will information be developed to allow development of policies to streamline the permitting process?
4) Will the option meet requirements of federal and state law?
5) Will the costs of compliance be reasonable?

All but the first option would involve a significant amount of Regional Board staff time to develop appropriate amendments to the Basin Plan and take them through the Board adoption process. Most of the options would include significant participation by staff in working with the regulated community to develop appropriate amendments. The amendment process will require

[49] Information about this project can be found at @www.co.pima.az.us/wwm/wqrp.

significant input from other resource agencies and interested parties and their resource constraints will affect the speed amendments can be developed and the chances of success.

1. Participate in Statewide Efforts to Develop Policies and Use These to Guide Permit Development.

The State Board Freshwater Standards Unit has identified development of a statewide policy on EDWs as its top priority in Phase II of the readoption of the Inland Surface Waters and Enclosed Bays and Estuaries Plan.[50] Phase I was completed in March 2000. Current Phase II priority activities include the addition of staff and the execution of a contract in 2000/2001 to begin work pertaining to EDWs. The policy eventually developed through the State Board process would be used to guide permit development.

In addition to working with State Board to develop a statewide policy, Regional Board staff is committed to work with El Dorado Irrigation District (EID) on a proposed BPA for turbidity, pH, and temperature for Deer Creek (an EDW in El Dorado County). EID has agreed to reimburse staff time to support this effort, which is projected to be completed in November 2001. Staff has estimated that two Person Years (PYs) will have been spent on this project once completed.

Evaluation: The benefits of this option are that there would be statewide consistency in addressing the issues associated with EDWs and existing staffing would be adequate to implement the option. However, the regulatory cost is significant in that it is expected to take several years before a statewide policy can be adopted. In the near term this option would not help facilities that are up for renewal of permits (with the exception of EID) or new facilities proposing to discharge effluent to water bodies with limited dilution capacity. While this option fulfills the criteria 1, 3 and 4 and maybe 5 above, but the time spent waiting for a statewide policy would not adequately address criteria number 2. Under this option, dischargers may be subject to stiff fines for failing to meet current water quality objectives and regulatory staff would have to develop permit specific ways to deal with the requirements. Furthermore, the strategy of net environmental benefit alternatives may not be addressed in the statewide policy.

2. Design Site Specific Objectives and/or Beneficial Use Designations on a Permit by Permit Basis.

Under this option, staff would work with permittees who are developing proposed amendments to the Basin Plan to address some of their permitting issues. Resource augmentations (from dischargers or from other sources) would be required to support staff in developing potential BPAs and processing the amendment. Essentially all studies, environmental documentation and economic analysis would be completed by dischargers, including evaluation of instream conditions affected by effluent discharges.

Based on preliminary information from permittees, there are several facilities that would be interested in pursuing this approach. EID has already formally requested staff assistance in evaluating the information they have put together on their recommendation for amendments to the

[50] Phase I of the readoption included development of an implementation of the California Toxics Rule. The top priority for Phase II is a policy on EDWs.

Basin Plan for their discharge to Deer Creek for turbidity, pH, and temperature. The documentation prepared by EID could have broader application, and could lend itself to general BPAs that would address some of the parameter(s) of concern for other dischargers. The City of Roseville has also made requests for their Dry Creek and Pleasant Grove facilities and we anticipate requests from Placerville, Lincoln, Auburn, Placer County, Woodland, Davis, Vacaville, Manteca, Atwater, Lodi, Merced, Modesto, Patterson, and others. The adequacy of the information provided by permittees and the number of parameters under evaluation would determine the rate and success of any proposed amendment. All the general approaches discussed in the staff report could be explored with the individual dischargers as the appropriate regulatory remedy.

Evaluation: So far, only EID has established a formal agreement with the Regional Board for assistance. Initiation of work at other sites would depend on other permittees coming forward and formally requesting help and developing agreements on how to support Regional Board staff involvement. The Regional Board intends to make a request to State Board to provide resources to support some of this effort. However, such requests have not been successful in the past. Furthermore, even if dischargers willing to support Regional Board staff involvement, the Board has limited ability to add additional staff. Under current budget constraints, it is unlikely that the Regional Board will be authorized to hire more than about one or two new staff to work on EDWs.

The pace and overall cost of this effort to address all of the discharger issues depends on the completeness of information provided by the dischargers, the number of parameters being studied, and the number of dischargers interested in participating. In some instances, work done by one discharger could provide information that could support a general BPAs. In other instances, only a site-specific study is likely to generate the appropriate data for evaluation of a stream parameter. It, therefore, could take a long time to address all the facilities. This option would not provide resources to work on any of the broader issues associated with EDWs (i.e., biological, physical, and hydrological parameters) and there would be no general policy developed to streamline the permitting process. Data collected under this option would be site specific and its use for developing a general policy may be limited. Furthermore, site specific evaluations may not provide consistent objectives that address the health of the watershed and may limit net environmental benefit analyses. An approach that addresses the issues on a watershed basis (not permit by permit) might have a better chance of success.

Based on the apparent interest, Regional Board resource needs are estimated to be about one full time staff person for two years for each facility. With approximately 50 existing EDWs in the Central Valley, and an unknown number of proposed facilities, this approach could take a long time. Some economy of effort might be realized for dischargers working together in the same watershed. Evaluation of pre- and post- existing conditions is estimated to cost $25,000 per assessment. This option will satisfy criteria 1, 4 and 5, but the time needed to develop site specific objectives for each facility will make it difficult to fulfill criteria 2 and 3.

<u>3. Work Proactively with Groups of Dischargers within Watersheds to Develop Basin Plan Amendments and Address Discharger and Regional Board Concerns.</u>
In this option staff would work with all dischargers and other stakeholders in a particular watershed, regardless of whether or not their permits were up for renewal. Taking this "watershed ap-

proach" would be an effective way to manage this issue since all of the dischargers in a particular watershed would likely face similar issues and concerns. This would allow staff to consider all affected dischargers' and stakeholders' concerns while developing watershed-specific criteria for EDWs. This approach would also assist staff in coordinating with local community groups who are often organized along watershed boundaries.

Furthermore, working at the watershed level would facilitate monitoring and assessment efforts, a critical component of any policy designed to address EDWs. By focusing on a distinct watershed, staff can direct efforts to gather baseline data, monitor existing EDWs, and compare existing EDWs with unimpacted reference streams from the same area. Since the physical, chemical and biological attributes within a given watershed are relatively similar, this approach lends itself to the development of effective watershed solutions. For example, a net environmental benefit analysis conducted on a watershed basis may result in the development of detailed stream restoration guidelines to offset impacts from effluent discharge in that watershed. These guidelines would be supported by relevant baseline data and applicable to all EDWs within the watershed.
If supplemental funding and staffing can be identified, additional data would be collected to concurrently work on developing a policy framework. Several years of data would be needed to develop the policy. The policy would consider other factors besides chemical specific water quality objectives. Once developed, the policy could streamline permitting efforts for the remaining EDWs. Staff anticipates beginning work on the policy as an outgrowth of working with EID, but work will be limited to available resources. The State Board is committing staff and contract resources for activities that contribute to development of a statewide policy. Region 5 staff could also work with the State and other Regional Boards to develop a statewide policy.

Staff recommends working with stakeholders in Placer County (Lincoln, Roseville, and Auburn areas) to launch a pilot project to work on a regional solution to the EDW issues which that region faces. In this area, there are nine existing facilities and one proposed facility (the City of Lincoln) discharging to small creeks (see Figure 2). Dischargers are concerned that the temperature, turbidity, dissolved oxygen, and pH objectives in the basin plan are not appropriate. It is possible that the efforts underway with EID will produce a basin-wide BPA that will address both turbidity and pH. However, current efforts with EID are focused on developing site specific BPAs that would not be applicable anywhere except for the Deer Creek facility. It is also expected that the temperature issue will be more complex to resolve and would benefit from a watershed approach. Taking a watershed approach may provide more options and have the best chance of addressing individual discharger concerns. This pilot project could provide useful information to the State and other Regional Boards and assist in the development of a statewide policy.

Evaluation: The benefit of this option is that it would work with stakeholders to create sustainable, watershed level and/or regional solutions to water quality problems. Option 3 would allow staff to identify watershed level parameters of concern and address those issues in an efficient manner. This option would start addressing dischargers concerns and at the same time would start to gather the information needed to establish a region wide or statewide policy that would streamline future permitting actions. A negative aspect is that it may take a long time to address

all of the dischargers' concerns. The costs would be the same as Option 2, with additional resources needed to collect data (chemical, biological, physical, and hydrological) and to support staff time to work on developing the general policy. In addition to any site-specific studies conducted, the cost for data collection for the general policy is expected to cost about 15% more per year per facility for three years to conduct two water quality assessments per year. Additional staff costs for policy development would be about 1/4 staff person annually for three years for each facility. This option satisfies criteria 1, 3, 4, and 5 and to some extent 2 (especially for those dischargers who's needs would be addressed first). This option has the same drawbacks as Option 2. Even with the support of dischargers, it is unlikely that the Regional Board will be able to augment current staffing levels to quickly address all the discharger issues. However, the effort can be scaled to accommodate funding levels and this option appears to be the most cost effective.

STAFF RECOMMENDATIONS AND DISCUSSION

Staff recommend that Option 3 be selected for implementation on a watershed basis. Option 3, would appear to be the option that best satisfies the evaluation criteria. Individual discharger concerns would be addressed in the short-term, while, concurrently, watershed specific and regionwide policies would be developed that would streamline the permitting process in the future and assure that all the important issues associated with EDWs are addressed. While the cost of implementing Option 3 is similar to Option 2, Option 3 offers several advantages that are derived because of the focused attention at the local watershed level directed toward developing regional or area specific solutions to the problems.

In Option 3, staff proposes that, in addition to working with EID on Deer Creek, efforts would focus on working with stakeholders in Placer County. Experience gained through working with EID should jump start the program as significant data and information have already been compiled. Early lessons learned working through EID's proposal should make future efforts easier.

Focusing in the watershed areas of Auburn/Roseville/Lincoln offers several advantages, including the following:

1) Nearly all the different issues discussed in this paper exist in the group of dischargers in the Auburn/Roseville/Lincoln area.
2) By addressing issues on a watershed basis, the range of options is greatly expanded.
3) The issues can be considered in relationship to other activities in the watershed.
4) A watershed wide management plan can be developed to help guide water resource protection and development.
5) Working on a watershed basis is consistent with the State and Regional Board Strategic Plan.

Option 3 will allow staff to develop an adaptive management strategy to address the EDW issue. Under this option, staff could adapt language from the EID site specific BPA to develop a basinwide BPA for some parameters (probably pH and turbidity). Concurrently, staff can utilize

available resources, such as AB 982 funds[51], to work with dischargers and other stakeholder groups to begin a comprehensive monitoring program in Placer County this year. Staff would work with all permitees in Placer County, regardless of whether their permits are up for renewal or not, to develop watershed-specific solutions to the EDW issues. At the same time, staff will devote some time to work on a basin-wide policy, as well as work with the statewide efforts initiated by the State Water Board. As time and resources permit, staff will identify the next watershed to begin working on.

The most significant disadvantage to Option 3 is that, by focusing in one watershed area (albeit a larger area and with multiple dischargers), dischargers in other areas may not have their issues addressed immediately. This is a potential problem with any alternative. Option 3 does not exclude staff from working with other dischargers; however, staff is limited and the ability to work on multiple requests may also be limited. It may be that a prioritization scheme will need to be developed. In all cases, staff efforts will need to be funded through the identification of additional resources or reimbursed through a cost recovery program. Another constraint is that even if dischargers agree to provide resources to address this issue, there is limited ability to hire additional staff at the Regional Board. Option 3 appears to be the most cost effective option with the highest probability of resulting in successful Basin Plan amendments.

The work described under Option 1 (participation in statewide efforts) needs to be completed regardless of what option or combination of options is selected for implementation. The option includes completing existing basin planning commitments (completing triennial reviews, reviewing statewide plans, and working on the existing waiver policy), including devoting a small amount of resources to work with State Board on development of statewide policies on EDWs. This option will not meet any of the short-term (3-5 years) needs of the dischargers and will not provide any guidance or policy for several years. However, working with the State Board on development of an EDW policy may result in additional resources for Region 5's watershed approach to addressing EDWs. The pilot project developed by Region 5 may assist the State Board and other Regional Boards in the development of a statewide EDW policy.

The limited staff currently authorized for Basin Planning are working on legally mandated and Board priority projects and are not free to undertake additional projects. Present budget projections indicate that the basin planning allocation for the next few years will remain the same. Therefore, funding augmentations will be required to support any work that is undertaken on BPAs to address EDWs. If planning staff are directed to work on the EDW issue, absent additional funding, legally mandated Basin Planning activities will not get done.

[51] More information about AB 982 can be found at: http://www.swrcb.ca.gov/ab982/index.html

Summary Table of Ongoing and Recommended Activities

Ongoing Activities	**Progress to Date**	**Recommended Activities**
1. Work with EID to develop site specific Basin Plan amendments for pH, turbidity and temperature for their Deer Creek Facility.	▪ Draft site specific amendments for pH, turbidity and temperature are expected on September 1.	▪ Continue supporting EID's efforts to meet the compliance schedule outlined in the Board Order 5-00-033.
2. Develop a basin-wide policy on EDWs for Region 5. Work with the State Board, state and federal regulatory agencies, dischargers, environmental groups and other stakeholders to develop this policy.	▪ Board presentation on EDWs on 8/4/00 ▪ Draft issue paper on EDWs, submitted for public comment on 9/8/00.	▪ Work with dischargers and other stakeholders on a watershed basis, starting with EDWs in Placer County. ▪ Collaborate with State Board's efforts to develop a statewide policy for EDWs.

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APPENDIX

Figure 1: NPDES Wastewater Treatment Plants Discharging to Ephemeral or Low Flow Streams in the Sacramento and San Joaquin Watersheds

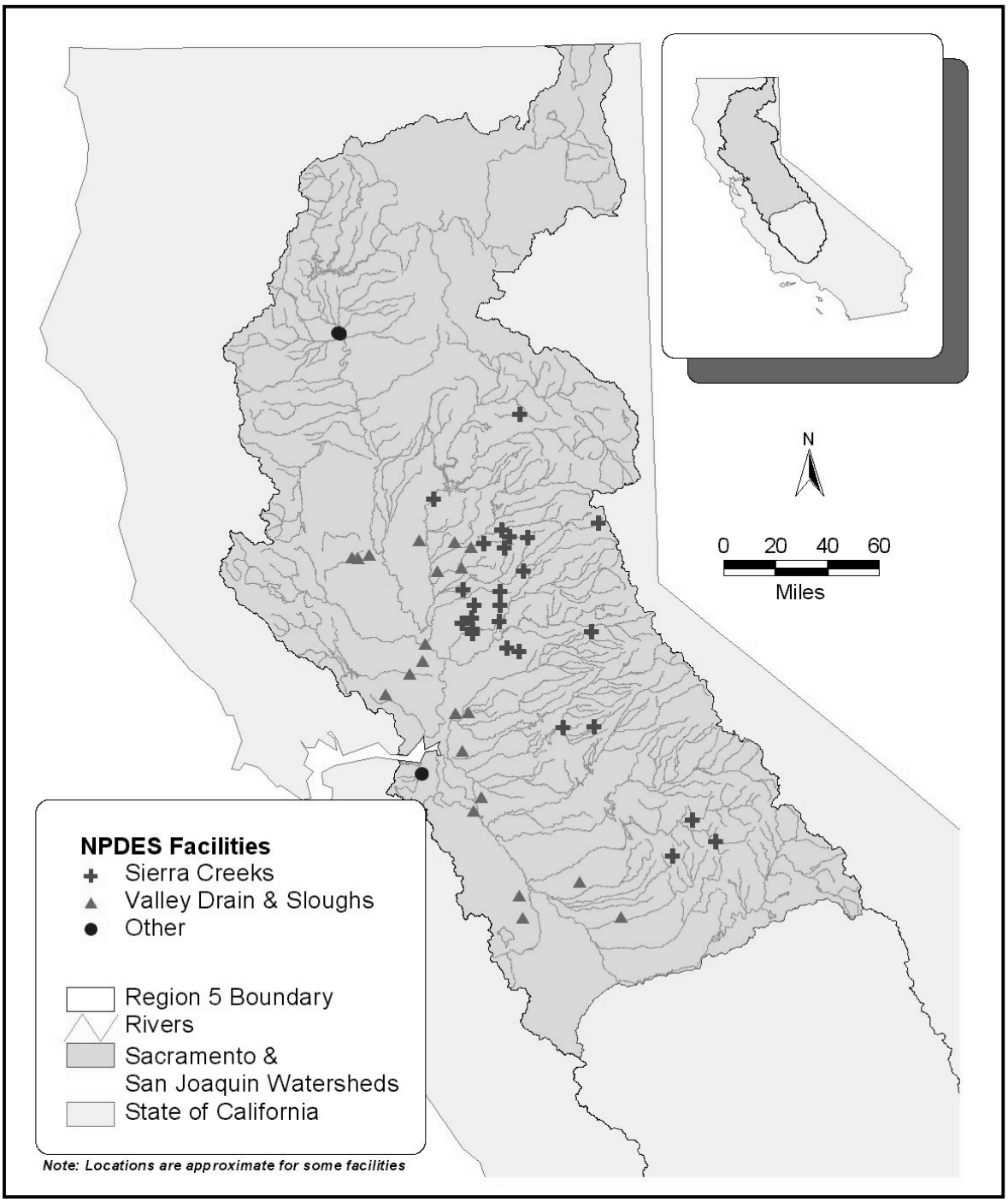

Figure 2: Permitting Status for Effluent Dominated Water Bodies in the Sacramento and San Joaquin Watersheds - Facilities in Placer County Highlighted

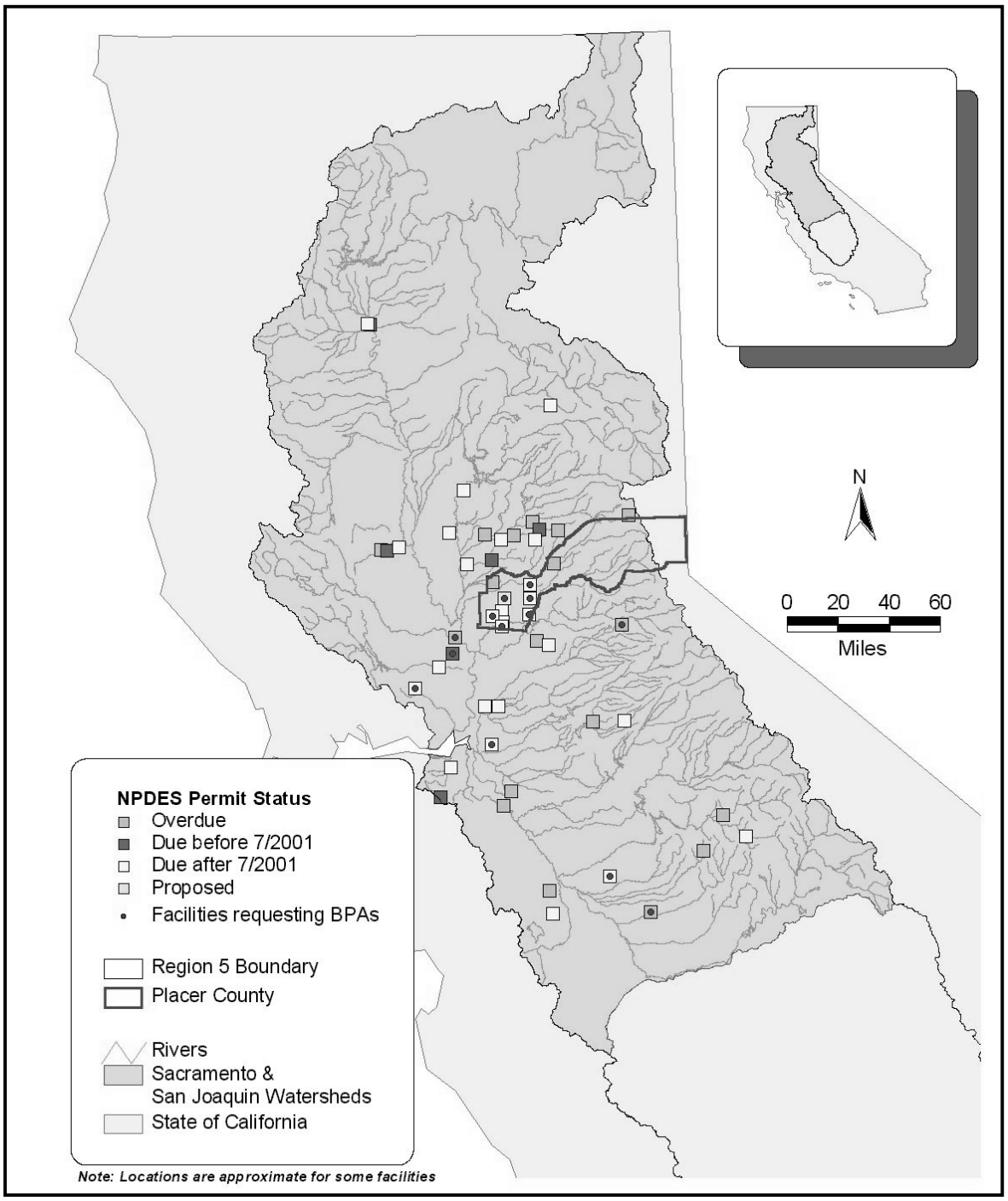

Table 1: Wastewater Treatment Plants discharging to ephemeral or low flow streams in the Sacramento & San Joaquin Watersheds

#	County	Discharger	NPDES #	Permit Adoption	Permit Expiration	discharge volume dry/wet (mgd)	discharge capacity dry/wet (mgd)	Receiving Water	General Location
1	Amador	Jackson	CA0079391	06/16/2000	06/16/2005	0.42	0.71	Jackson Cr.,tributary to Lake Amador (a drinking water supply).	Sierra Creeks
2	Butte	Biggs	CA0078930	01/27/1995	01/27/2000			Sl., Feather R.	Valley Drains and Sloughs
3	Butte	Oroville/Wyandotte	CA0079235	06/11/1999	06/01/2004	0.25	0.6	Miner's Ranch, Feather R.	Sierra Creeks
4	Calaveras	San Andreas	CA0079464	02/24/1995	02/01/2000	0.224		San Andrea Cr., tributary to NF Calaveras R.	Sierra Creeks
5	Colusa	Colusa City	CA0078999	09/20/1996	09/01/2001	0.9		Powell Sl., tributary to the Colusa Basin Drain.	Valley Drains and Sloughs
6	Colusa	Maxwell	CA0079987	03/22/1996	03/01/2001	0.07/ 0.12	0.2	Manmade ag. drainage ditch, Lurline Cr., tributary to the Colusa Basin Drain.	Valley Drains and Sloughs
7	Colusa	Williams	CA0077933	08/10/1990	08/01/1995	0.428/ 1.5	0.5	Salt Cr., tributary to Freshwater Cr. and the Colusa Basin Dr.	Valley Drains and Sloughs
8	Contra Costa	Brentwood	CA0082660	06/16/2000	06/16/2005	0.25-0.60		Marsh Cr., tributary to the SJR .	Other

*Note: This may not be a comprehensive list. This list may be modified with further investigation.

#	County	Discharger	NPDES #	Permit Adoption	Permit Expiration	discharge volume dry/wet (mgd)	discharge capacity dry/wet (mgd)	Receiving Water	General Location
9	El Dorado	Deer Creek WWTP	CA0078662	09/17/1999	09/17/2002	2.3/8.9		tributary to the Cosumnes river	Sierra Creeks
10	El Dorado	El Dorado Hills	CA0078671	06/23/1995	06/01/2000	1.6	3	Carson Cr., tributary to Deer Cr., tributary to the Cosumnes R.	Sierra Creeks
11	El Dorado	Hangtown Creek	CA0078956	12/09/1994	12/01/1999			Hangtown Creek	Sierra Creeks
12	Mariposa	El Portal WWTF	CA0081759	03/24/1995	03/01/2001			Merced R.	Sierra Creeks
13	Mariposa	Mariposa WWTP	CA0079430	10/28/1994	10/28/1999	0.11	0.61	Mariposa Cr., tributary to Duck Sl., tributary to the Eastside Canal, tributary to the SJR.	Sierra Creeks
14	Mariposa	Wawona WWTP	CA0081795	10/29/1999	10/01/2004	0.031	0.105	SF Merced R.	Sierra Creeks
15	Merced	Atwater STP	CA0079197	02/14/1995	02/01/2005	3.4	6	Atwater Drain, SJR	Valley Drains and Sloughs
16	Merced	Gustine	CA0081272	04/28/2000	04/28/2005	0.91	1.2	Los Banos Cr., tributary to Mud Sl., tributary to the SJR.	Valley Drains and Sloughs

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#	County	Discharger	NPDES #	Permit Adoption	Permit Expiration	discharge volume dry/wet (mgd)	discharge capacity dry/wet (mgd)	Receiving Water	General Location
17	Merced	Merced	CA0079219	06/24/1994	06/01/1999			Harley Sl., tributary to Owens Cr., tributary to SJR.	Valley Drains and Sloughs
18	Nevada	Cascade Shores	CA0083241	05/20/1994	05/01/1999		0.059	Gas Canyon Cr., tributary to Greenhorn Cr., Bear R., and Rollins Reservoir.	Sierra Creeks
19	Nevada	Donnor Summit	CA0081621	06/23/1995	06/21/2000	0.15/ 0.28	0.52	S. Yuba R.	Sierra Creeks
20	Nevada	Grass Valley	CA0079898	04/17/1998	04/01/2003	/ 7	2.78	Wolf Cr., tributary to Bear R. and Camp Far West Reservoir.	Sierra Creeks
21	Nevada	Lake of Pines	CA0081612	05/26/1995	05/24/2000	0.38/ 0.54	0.72	Magnolia Cr., tributary to Bear R.	Sierra Creeks
22	Nevada	Lake Wildwood	CA0077828	05/26/1995	05/24/2000	0.70/ 1.6	1.12	Deer Cr., tributary to Yuba R.	Sierra Creeks
23	Nevada	Nevada City	CA0079901	05/03/1996	05/01/2001	0.41/ 0.8	0.69/ 0.90	Deer Cr.	Sierra Creeks
24	Placer	Auburn WWTP	CA0077712	09/11/1998	09/10/2003	1.35	1.67	Auburn Ravine tributary of the SR	Sierra Creeks

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#	County	Discharger	NPDES #	Permit Adoption	Permit Expiration	discharge volume dry/wet (mgd)	discharge capacity dry/wet (mgd)	Receiving Water	General Location
25	Placer	City of Lincoln	proposed	proposed	proposed			Auburn Ravine tributary of the SR	Sierra Creeks
26	Placer	Colfax	CA0079529	03/24/1995	03/01/2000	0.07	0.13	Unnamed tributary of Smuthers Ravine, Bunch Cr., tributary to the NF American R.	Sierra Creeks
27	Placer	Formica	CA0004057	06/20/1997	06/01/2002	0.03		Pleasant Grove Cr., Pleasant Grove Crk canal, Natomas Cross Canal, SR	Sierra Creeks
28	Placer	NEC	CA0081922	04/30/1999	04/28/2004	0.14/0.18		South branch Pleasant Grove Creek, Pleasant Grove Crk, Pleasant grove crk canal, Natomas Cross canal, SR	Sierra Creeks
29	Placer	Placer Co. No. 1	CA0079316	06/20/1997	06/01/2002	1.68/ 2.55	2.18	Rock Cr., 200 ft. above the confluence of Rock Cr. And Dry Cr., Coon Crk. SR	Sierra Creeks
30	Placer	Placer Co. No. 3	CA0079367	06/16/2000	06/16/2005	0.100/ 0.29	0.3	Miners Ravine, Dry Creek, Natomas East Main Drain, SR	Sierra Creeks
31	Placer	Pleasant Grove WWTP (facility yet to be constructed)	CA0084573	03/17/2000	03/31/2005		12.0/ 30.0	Pleasant Grove Cr., tributary to Pleasant Grove Cr. Canal, Natomas Cross Canal, and the S.R., south of confluence w/Feather R.	Sierra Creeks

*Note: This may not be a comprehensive list. This list may be modified with further investigation.

#	County	Discharger	NPDES #	Permit Adoption	Permit Expiration	discharge volume dry/wet (mgd)	discharge capacity dry/wet (mgd)	Receiving Water	General Location
32	Placer	Roseville Dry Creek WWTP	CA0079502	06/16/2000	06/16/2005	12.5	18/45	Natomas East Main Drain to SR	Sierra Creeks
33	Placer	Sheridan	CA0079341	12/03/1993	12/01/1998	0.1		Yankee Slough, Bear River	Sierra Creeks
34	Plumas	Quincy	CA0078981	04/30/1999	04/01/2004			Spanish Cr., tributary to Feather R. (only wet)	Sierra Creeks
35	Sacramento	Galt	CA0081434	06/20/1997	06/01/2002	1.45	3	Laguna Cr., tributary to the Cosumnes R. and to irrigation ponds.	Valley Drains and Sloughs
36	Sacramento	Rio Cosumnes	CA0079961	01/24/1997	01/01/2002			Dry Cr.	Valley Drains and Sloughs
37	San Joaquin	Deuel	CA0078093	08/05/1994	08/01/1999	0.428/ 0.067	0.62	Deuel Drain, tributary to Paradise Cut, Old River, and SJR.	Valley Drains and Sloughs
38	San Joaquin	Sharpe STP	CA0003905	09/25/1992	09/15/1997	0.112	0.38		Valley Drains and Sloughs
39	San Joaquin	Tracy	CA0079154	05/03/1996	05/01/2001	5.9	9	Old River (Outfall No.1), tributary to the Middle River, San Joaquin, and Delta	Valley Drains and Sloughs

*Note: This may not be a comprehensive list. This list may be modified with further investigation.

#	County	Discharger	NPDES #	Permit Adoption	Permit Expiration	discharge volume dry/wet (mgd)	discharge capacity dry/wet (mgd)	Receiving Water	General Location
40	San Joaquin	White Slough, Lodi	CA0079243	01/28/2000	01/28/2005			Dredger Cut, White Sl., tributary to the Sacramento and San Joaquin Delta	Valley Drains and Sloughs
41	Shasta	Shasta Lake WTP	CA0004693	01/28/2000	01/28/2005			Churn Cr., tributary to the SR (only wet).	Other
42	Shasta	Shasta Lake WWTP	CA0079511	06/21/1996	06/20/2001			Churn Cr., tributary to the SR (only wet).	Other
43	Solano	Vacaville	CA0078018	06/16/2000	06/20/2002	0.3	1.4	Gibson Canyon Cr., tributary to Cache Sl., tributary to SR.	Valley Drains and Sloughs
44	Stanislaus	Turlock	CA0078945	03/24/1995	03/01/2000		0.173	TID5,tributary to the SJR	Valley Drains and Sloughs
45	Sutter	Live Oak	CA0079022	04/30/1999	04/01/2004	1.6	3.347	Reclamation Dist. No. 777 Lateral Drain No. 1, tributary to the SR.	Valley Drains and Sloughs
46	Yolo	Davis	CA0079049	04/30/1999	10/01/2000	4.5	5.3	Willow Sl. Bypass, tributary to the Yolo Bypass at point 001.	Valley Drains and Sloughs
47	Yolo	UCD	CA0077895	10/24/1997	10/01/2002	1.6/ 2.9	2.5	SF Putah Cr., tributary to the Yolo Bypass.	Valley Drains and Sloughs

*Note: This may not be a comprehensive list. This list may be modified with further investigation.

#	County	Discharger	NPDES #	Permit Adoption	Permit Expiration	discharge volume dry/wet (mgd)	discharge capacity dry/wet (mgd)	Receiving Water	General Location
48	Yolo	Woodland	CA0110299	05/03/1996	05/01/2000	6.99	7.8	Tule Canal, tributary to the Yolo Bypass.	Valley Drains and Sloughs
49	Yuba	Beale	CA0110299	05/03/1996	05/01/2001	0.7		Hutchinson Cr., Western Pacific Inceptor, tributary to Bear R.	Valley Drains and Sloughs
50	Yuba	Olivehurst	CA0077836	12/06/1996	12/06/2001	1.2/ 4	1.8	Western Pacific Interceptor Dr. Canal, tributary to Bear R.	Valley Drains and Sloughs
51	Yuba	Plumas Lake	CA0083607	12/09/1994	12/01/1999			Algodon Sl., tributary to Bear R.	Sierra Creeks
52	Yuba	River Highlands CSD/ Hammonton	CA0081574	08/09/1996	08/01/2001	0.0001	0.03	Sanford Cr., tributary to Yuba R.	Valley Drains and Sloughs

*Note: This may not be a comprehensive list. This list may be modified with further investigation.